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A Transportation Services Center for Greenville, South Carolina

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[redacted] A TRANPORTATION SERVICES CENTER FOR GREENVILLE, SOUTH CAROLINA

A Terminal Project submitted to the Faculty
of Clemson University in partial fulfillment
of the requirements for the degree of Master
of Architecture

Department of Architectural Studies

Submitted by:

[redacted] David Hubert Ross

May, 1975

DEDICATION

To Kerry for your understanding, your patience,
and for your love.

■ ACKNOWLEDGEMENTS

■ The Auther wishes to express thanks to the following persons, not only for their assistance in the preparation of this terminal project, but also for their friendship and guidance during the past six years:

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Gayland Witherspoon

Aitken Clark

Ken Carpenter

Ken Russo

Donald Collins

George Means

■ And a special thanks to all of my classmates

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INTRODUCTION

The urban areas within this country are growing rapidly due to the demands of our ever-increasing population. Planning for the appropriate systematic development of these areas is essential. The problem to which this project focuses its attention is the necessity for proper planning to alleviate and avoid the increasing problems of our transportation networks, as these problems are a basic element in hindering urban growth.

This study was undertaken with the idea that public transit systems could function more efficiently, and thereby increasing their usage by the masses, if there was a deliberate effort by the various transportation concerns to work together as a cohesive unit to provide a higher level of transport services.

Prior to the actual design process, in-depth investigations were made into existing transportation modes and proposals related to future transport systems.

The area selected for study was Greenville, South Carolina. This area was chosen as it is an urban area of presently moderate size but which is expected to experience rapid growth during the next two decades. Also, the present transport systems are functioning inefficiently and there is a desire within the authorities of the City to improve the network as a whole.

The basic design philosophy employs the concepts of increased accessibility of transport modes, increased efficiency of both the individual concerns and the system as a whole, and convenience to the transit patron.

The design solution is a comprehensive transportation services center planned for the convenience of the transient, and for the incorporation of all local public transport modes into a singular facility and operating under a singular Authority within the boundaries of the City of Greenville.

TRANSPORTATION: AN OVERVIEW

"....No technological breakthrough, for example in telephone or radio, is likely to effect communications so radically that people will no longer need to meet face to face or to move outside their homes. On the contrary, if the pattern of movement in the United States is any thing to go by, people are moving around more than ever before. In spite of the universality of the telephone, more people are travelling between cities and even countries on business and pleasure. The increase of liesure time, together with cheap mobility afforded by the private auto and the airplane, is encouraging people to travel...."

"The sheer volume of travel that occurs within and between metropolitan areas is enormous, and there are indications that it will continue to increase even faster than population growth."

"Urban transportation in America now consists of some seventy billion trips annually by private automobile, six billion by motor bus, and two billion by railway. During the past decade urban automobile traffic increased by fifty percent while transit remained about constant."

" Public forms of transportation, by failing to keep pace with changing needs, have almost ceased to exist as meaningful alternative in many areas. The private automobile does perform many services admireably, and thus insuring its future, as a major element of future urban mobility. But nearly sole reliance on this single mode of urban transportarion is self-defeating."

There are many diverse opinions on exactly what are the priorities in future transportation problem solving, but there seems to be complete agreement that although the private automobile is now functioning as the major means of transport, it will be physically impossible for this to continue very far into the future. Population and urban growth and expansion, and the ever increasing monitary costs to the individual and the masses dictate that other forms of transport must be developed; not necessarily as modes to replace the automobile, but rather to compliment it.

The specific problems which have been caused by or are an indirect result of this major dependence on private transport and the non-use and non-development of mass transit systems are problems which affect the whole urban complex and not merely the transportation network itself. The following is a summarization of the major problems authorities feel must be dealt with in order to create a more workable transport network for the future.

- The pollution of the environment
  air pollution by both private automobiles and most means of public transport
  noise pollution
  visual pollution
- Inefficient land use
  it has been estimated that in most cities twenty-six to forty percent of the actual land area within urban metropolitan areas is presently used for the purpose of auto-transportation
- The reduction of urban opportunities for auto-non-users
- The isolation of minorities- mainly economic groups
- Traffic safety
- Urban sprawl
- The resultant decline of the Central Business Districts in many of our major cities

Possibly the most valid approach to a solution to the overall transportation problem is to balance the use between private transport and pulic transport. It would appear that if the standard of service provided by public transportation modes can be upgraded to an acceptible and efficient level and made attractive, convenient, and economically suitable to the individual, the present reliance on private automotive transport may be resolved.

In an overall effort to correct some of the transport problems, the automotive transport mode cannot be disregarded. It will be required that vast improvements be made in the automotive-high-

way system. Further, improvements in the vehicles themselves will be required. "But advances in this direction alone cannot suffice either to provide service to the limited mobility groups or to avoid the main burden of the system.

The generally accepted and seemingly most economic means of attacking these solutions is to maintain the existing systems of public transport. This does not mean that innovations and reorganizations are not necessary. On the contrary, the basic systems that now exist, in order to function more effectively and efficiently, will require many new innovations in technology and extensive restructuring and reorganization to accomodate the demands of future transportation.

Assuming that changes and advances are made in the area of public transport, it is predicted that rail and bus transportation will become a major means of mobility for the individual. Automobiles will remain a major mode of movement, however, it is expected that the economic strain of operating a private auto will make particular uses of this vehicle unattractive. These uses will include long-distance trips between urban centers; those trips for which rail and bus transport are designed. The resultant decrease in inter-city motorway use by the private auto will afford more convenient and rapid usage by the express bus.

Air travel will continue to be a major means of transport, but with the development and expanded use of the high-speed rail system, the efficient distances of air transport will be narrowed. The relatively short distances of up to three and four

hundred miles will be best serviced by the rail, leaving longer distances to the air transport vehicles.

The urban transportation problem is increasing and will continue to increase. It will be impossible to solve the difficiencies in the system in a singular attempt. The solution will require time and vast amounts of money. Government, both local and national, private business, and the individual will be required to work together and accept a share of the responsibility for the task.

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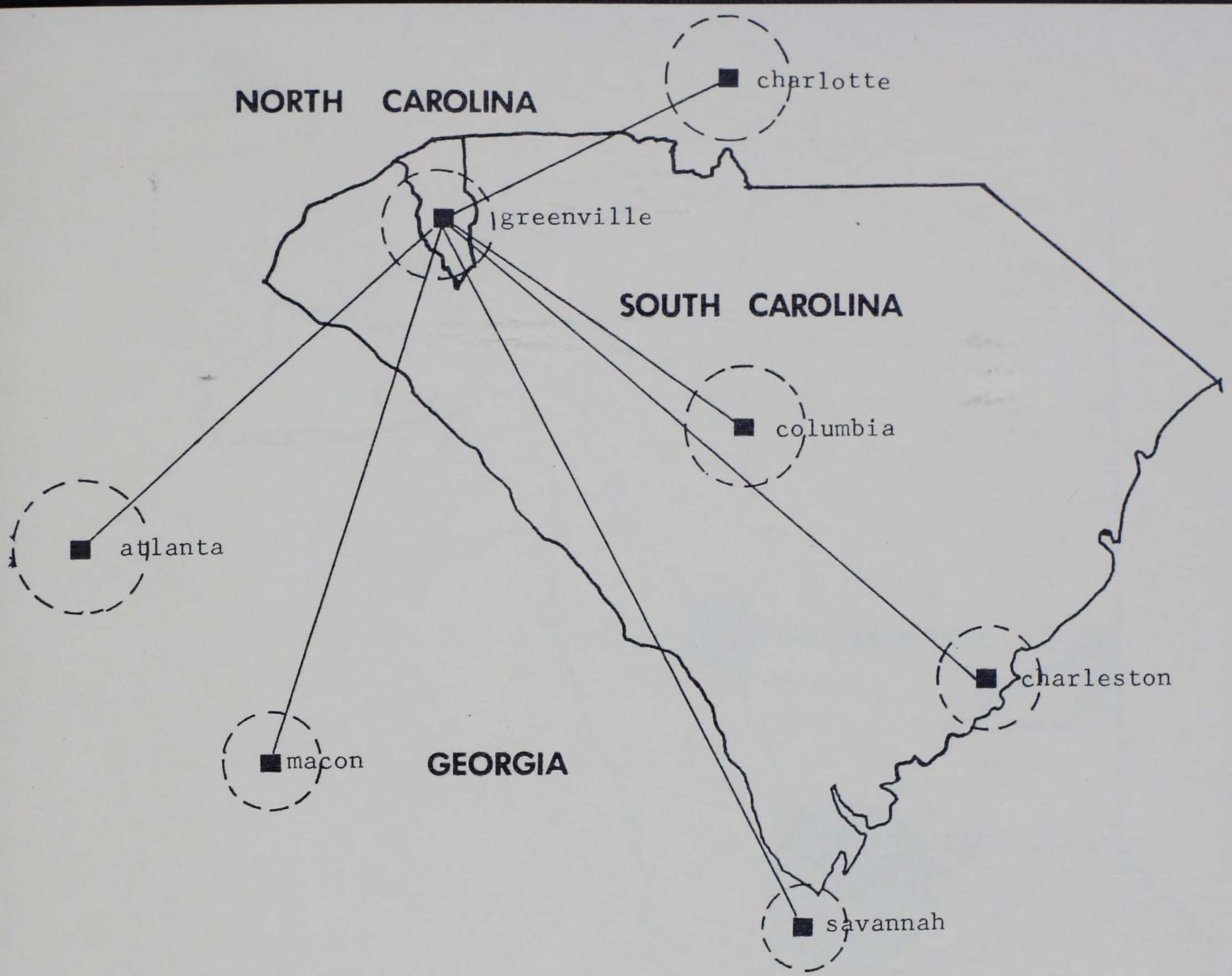
GREENVILLE, SOUTH CAROLINA

■ LOCATION :

Greenville County is located in the Northern portion of the State of South Carolina with Pickens County and Anderson County bordering it on the West and Southwest, respectively; and Spartanburg and Laurens Counties bordering on the East and Southeast. The county is bounded on the North by the North Carolina counties of Henderson, Transylvania, and Polk. The northern section of the county is crossed bt the southern-most mountains of the Blue Ridge Chain, with altitudes to 3400 feet. From that elevation, rolling hills reach down to the City of Greenville, which has an altitude of 1040 feet.

The City of Greenville is roughly in the center of the county placing it geographically in the heart of South Carolina's most industrialized area. This situation also places Greenville about equidistant from Chicago, New Orleans, New York, and Miami An important factor which will undoubtably effect the growth pattern of Greenville is that it ia located in the southern portion of the megalopolis extending from Roanoke, Virginia to Atlanta, Georgia, an area which economists predict will dominate the Southeast in years to come.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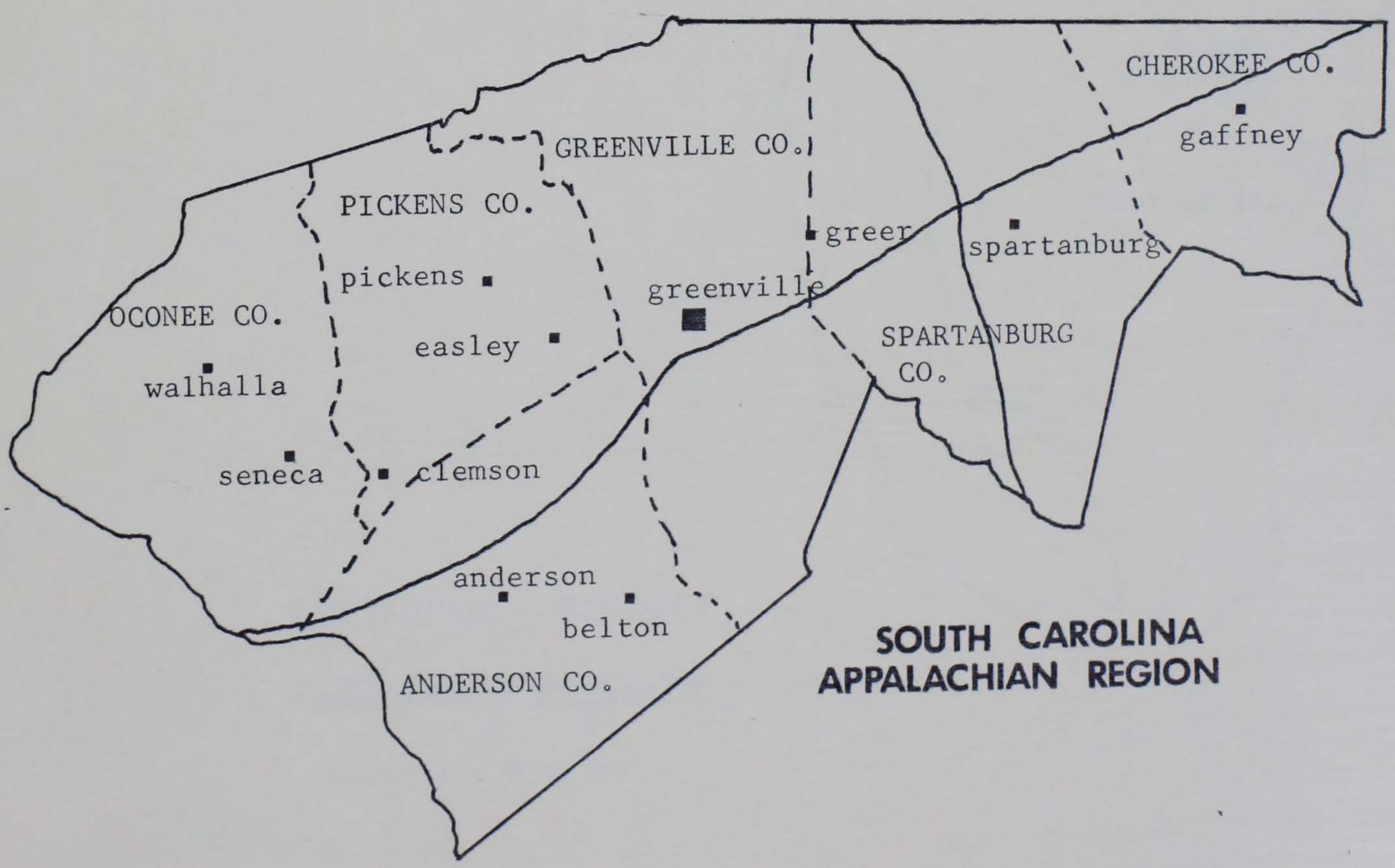
savannah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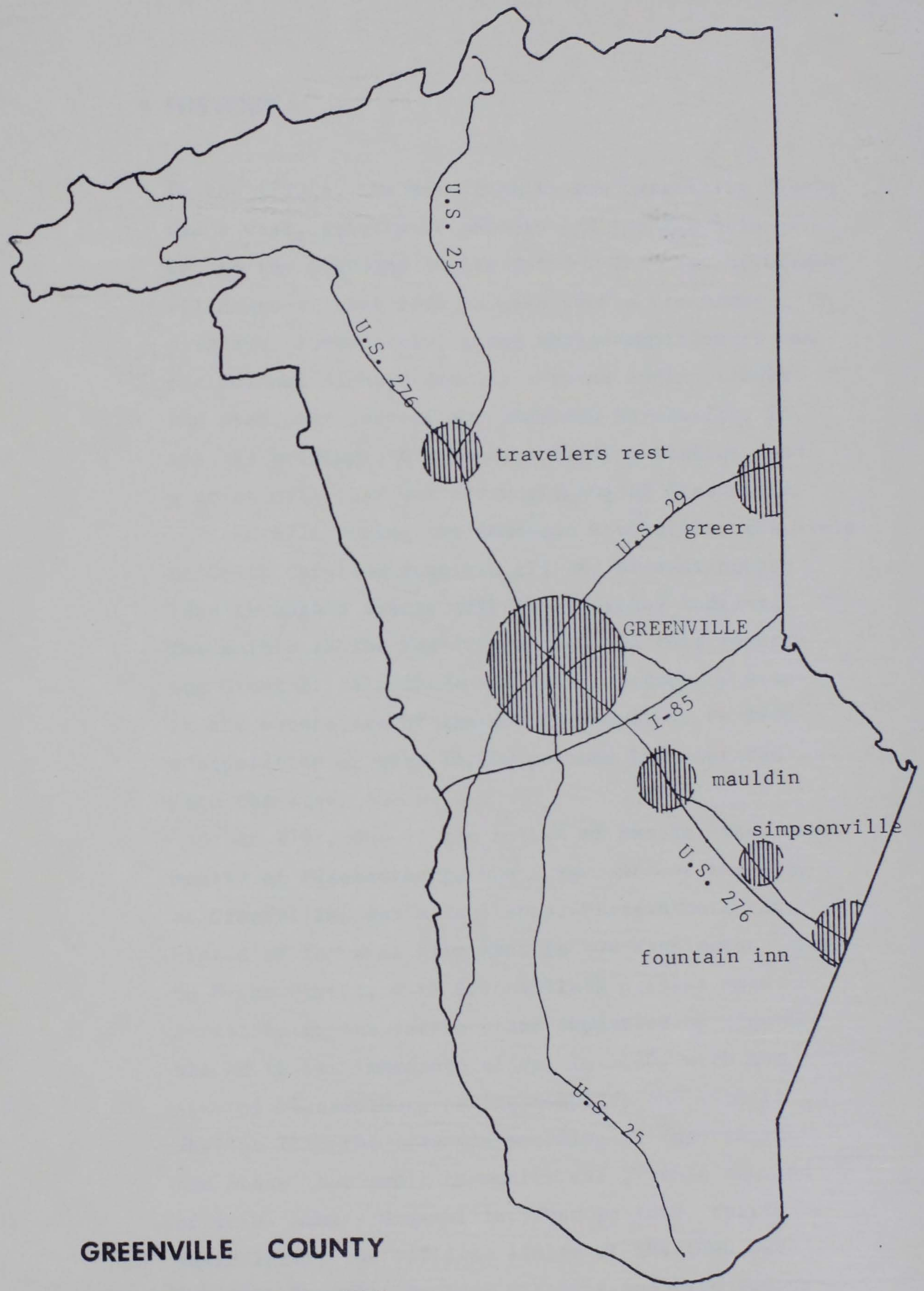
APPALACHIAN REGION



GREENVILLE COUNTY

0 8 12 16

scale: 1"= 8 miles

▪ HISTORY :

In the 1790's, the area that is now Greenville County was a vast, relatively uninhabited country belonging to the Cherokee Indian Nation. The City of Greenville was at that time no more than a few homesteaders. Fortunately, among these homesteaders was one Colonel Richard Pearis, a noted Indian trader and prominent Tory of the American Revolution. It was his holdings, his home, a trading station, and a grist mill that was the beginning of Greenville.

In 1776 during the American Revolution, the State of South Carolina acquired all the present county land through a treaty with the Cherokee Indians. Due mainly to the hostilities between this country and Great Britain there was little occupancy within the boundaries of the county; however, by 1800 a population of over 11,000 persons had migrated into the area.

In 1797, due to the influx of people, the community of Pleasantburg, the forerunner of the City of Greenville, was established. Pleasantburg consisted of the area from what is now Washington Street to Broad Street, with Greenville's present main street being the backbone and supported by flanking blocks to its immediate sides. In 1830, with the size of Pleasantburg having doubled, and with it obvious that the area was becoming of importance in the State, the small community was given a new and official name - Greenville. Then in 1860, thirty years later, the official limits of the town were set as being all the area within a one-mile radius of the center of town.

In this area of the South up to and during the Civil War, agriculture was the center of the economy; however, the high level of plantation development that characterized most of the South was not present in the area of the City or County of Greenville. Gradually other things began to supplement the agricultural environment, one of these being the Blue Ridge Mountains. This was mainly due to the weather in the southern portion of the State. The mountains attracted tourists from the hot and humid lower section of South Carolina, and since these tourists were generally wealthy, their demands for better transportation routes were not denied. Therefore, in the mid-1860's Greenville emerged as the chief trade and transport center in northwestern South Carolina.

After the Civil War the agricultural economy of the area began to diminish, and manufacturing began to assume the role of the future. The first form of manufacturing in the region was in the form of cotton mills. With widespread water power, abundance of raw materials, and available labor, the textile industry expanded rapidly. This expansion continued for over a half a century, drawing labor from the farms and mountain areas, and forcing agriculture into a secondary position.

In 1932 Greenville officially became a city, and by that time it was considered to be the "Textile Center of the South". About this time there began to be more diversification in the local economy, due mainly to the growth of the textile industry in the area. It became necessary for someone to supply the mills with raw materials, machinery, and

various chemicals. After the Second World War, there were years of increasing diversification due to the increase in mechanization and automation. This forced a decline in the textile industry and its employment.

By the early 1960's, a vast amount of expansion forced an acute labor shortage in the Greenville area and as a result, things had to level off in all industries. The present situation is greatly improved as most of the industries are far mor stable, and again ther is a trend toward expansion and improvement in most fields.

▪ POPULATION :

There are 51 major market areas in the United States of which one has been defined as the area incorporating the cities of Greenville, S.C., Columbia, S.C., Charlotte, N.C., and Greensboro, N.C. This marketing area is the most populus in the Southeast, being inhabited by over 7 million people. It should also be noted that the Carolinas' area has the greatest number of persons living outside the metropolitan area of any place in the country...almost 5 million people.

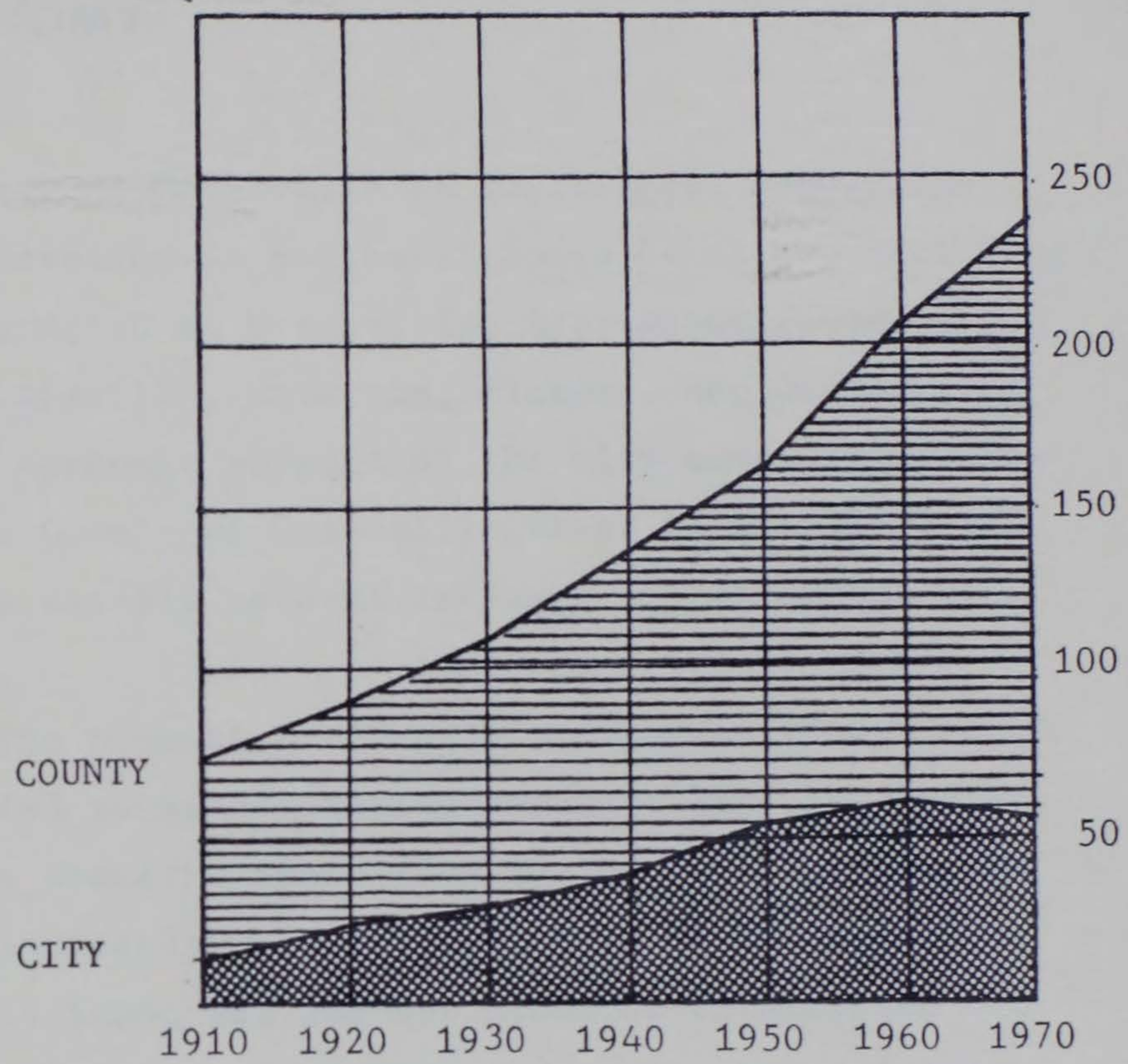
To further define the area, in December 1970, the Research Department of the Greenville Chamber of Commerce estimated that there were 1,900,000 persons living within a 75 mile radius of the City of Greenville.

Over the past twenty years, Greenville County has been one of the most rapidly growing areas in the Southeast. It is the largest county in the South Carolina Appalachian Region which is complosed of Greenville, Anderson, Oconee, Spartanburg, and Cherokee Counties. Its population has grown more rapidly than that of the United States as a whole, the two Carolinas, the South Carolina Appalachian Region, and many of the major urban areas in the Southeast. Based on the United States Census and estimates prepared by the Greenville County Planning Commission, Greenville's population increased from 209,776 persons in 1960 to 255,400 persons in 1973, an increase of 17.8%.

The statistics show that Greenville County and the Greenville Metropolitan area have registered substantial growth over the past 10 years, and this has naturally increased the need for adequate trans-

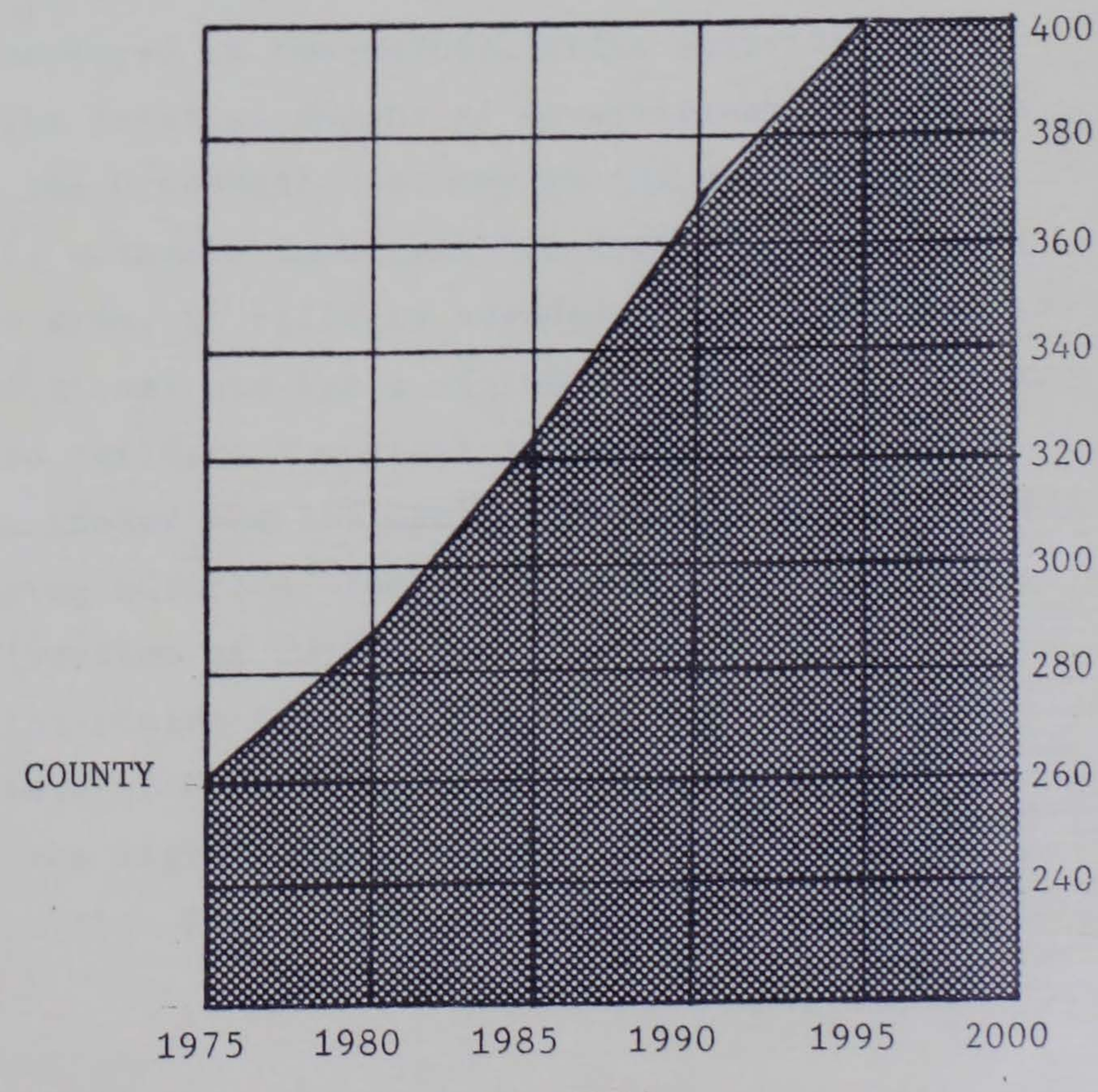
portation facilities. Of equal, if not greater, importance is the future growth and development of this urbanizing area. Based on relatively conservative estimates of population and employment, by 1990 Greenville County can expect to have a base population of approximately 370,000 persons, of which 200,000 or 54% will be employed in the local economy.

■ POPULATION TRENDS : 1910 – 1970



(NUMBERS OF PERSONS IN THOUSANDS)

■ POPULATION PROJECTIONS : 1975 – 2000



(NUMBERS OF PERSONS IN THOUSANDS)

■ ECONOMY:

The City of Greenville is the largest commercial concentration in northwset South Carolina, including the countied of Greenville, Spartanburg, Greenwood, Abeville, Anderson, Pickens, and Oconee. The major economic support of the city comes from within the County of Greenville where between 1950 and 1967 a seventy percent increase in employment occured.

The present Greenville economy, although still oriented to manufacturing and textiles, has undergone a dramatic transition in the past decade. The non-manufacturing activities have become relatively more important and new kinds of diversified and specialized manufacturing industries have clearly challenged the dominance of textiles in the local economy. In 1970, the Greenville County economy employed 116,000 workers, nearly two-thirds of whom were employed in non-manufacturing activities.

The relative extent of diversification achieved by the Greenville economy in the past two decades is extemely important for the future economy of the area. It reflects advantages for the location of additional new types of industries in the future. It also reflects a current stage of economic development (under the influence of the specializing and advancing nature of the economy) which points out the direction of future developments.

The rising importance of the manufacturing structure of Greenville County was clearly outlined by the high level of value added by manufacturers of more than $403 milliom in 1967, accounting for

thirteen percent of total value added by manufacturers in the State of South Carolina and reflecting the highest level of manufacturers' value added above all other counties in the State.

Next to manufacturing, retail trade employs more people than any other sector of the Greenville economy. Retail sales and employment have gained steadily since the end of the Second World War in face of increased local population and income and gains in local retail pruchases by nonresidents. Retail trade employment has increased by over eighty percent in the past two decades. Retailing now accounts for about forteen percent of total non-farm employment.

The sharp growth in shoppers goods sales in current and constant dollars reflects the specialization of retail trade in the Greenville economy as a basic income-producing activity servicing the county, the regional market, and transient visitors to the area. At the same time the growth in shoppers goods sales clearly defines the three different markets being serviced by Greenville retail outlets - the local market within the county itself, the surrounding counties in Northwest South Carolina, and the nonresident market involving business and tourist expenditures. All of these markets have solidified Greenville's position as the major retail center of th Piedmont Crescent of the Carolinas.

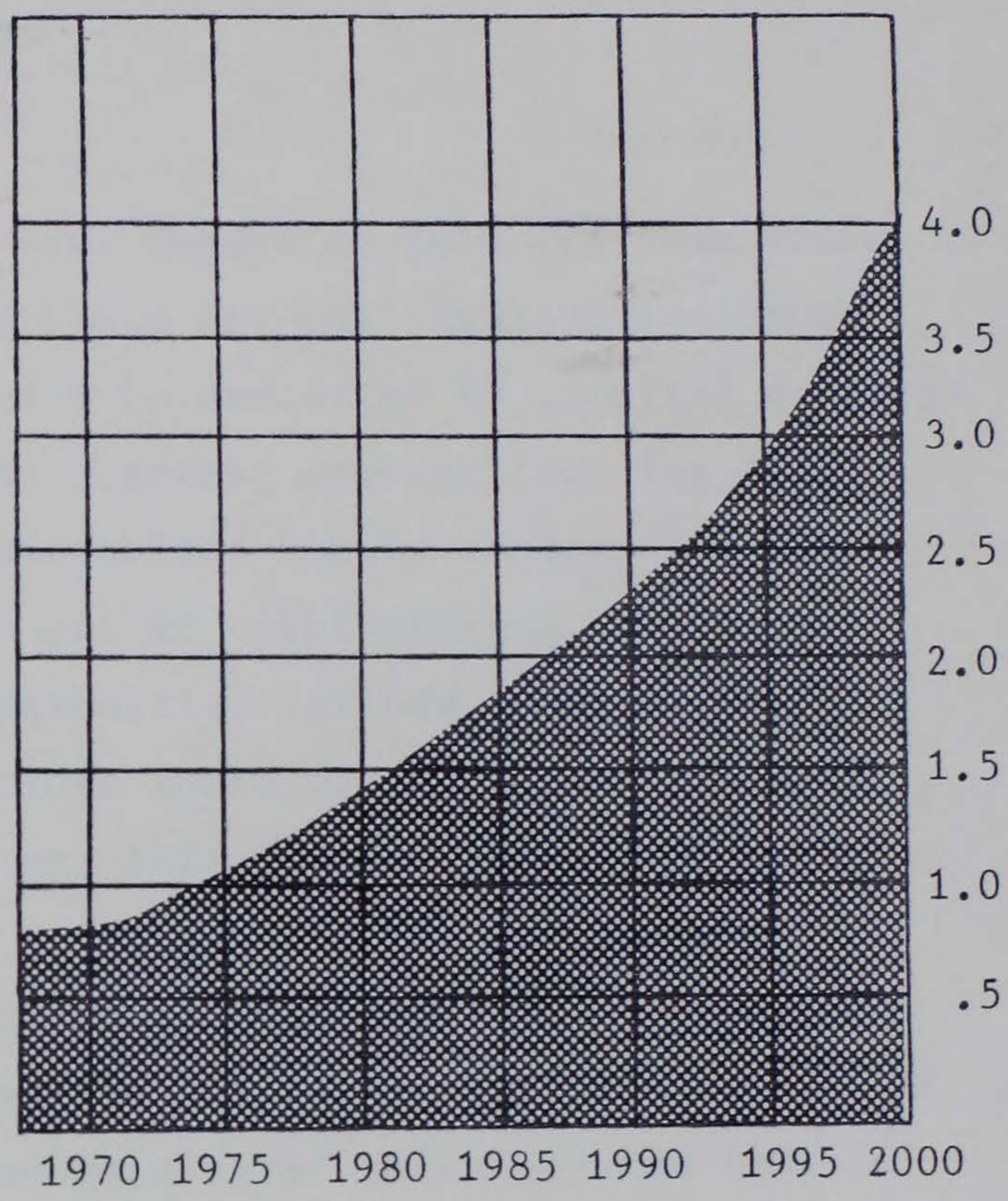
With the growth of the economy, average per capita income - the best single measure of economic wellbeing of an area's population - made a substantial gain between 1960 and 1970. This gain amounted to a 100 percent increase as measured in current

value dollars (purchasing power of the dollar in 1960 and 1970, respectively) and 53 percent increase as measured in constant 1970 value dollars.

While per capita income serves as a good measure of relative economic development and the economic well-being of the population, the total amount of income in an area is the critical dimension that determins market potential. Gains in total personal income can result from both population growth and household income gains. The population growth combined with gains in per capita income resulted in a gain of $463,500,000 in total personal income in Greenville County during the 1960-1970 period.

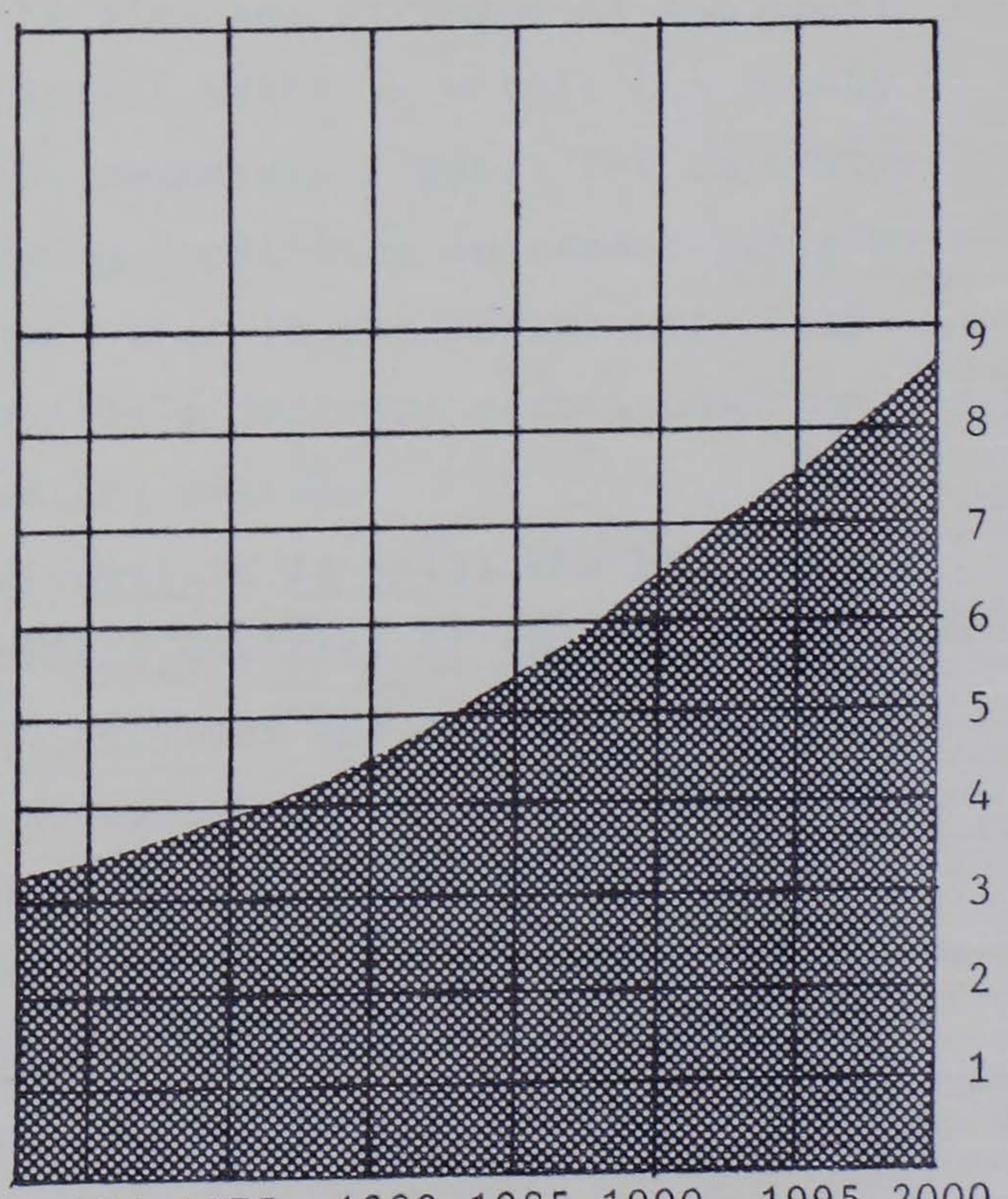
The best measure of purchasing power and demand for goods and services is disposable income, which is basically income left after taxes are deducted. Additionally, while personal income provides the basis for local markets, disposable income provides a better measurement of the feedback of personal income. The total personal disposable income of the population living in the Greenville County boundaries amounted to $667,700,000 in 1970. That represents an increase of 114 percent over a period of ten years.

■ PROJECTED TOTAL PERSONAL INCOMES



(In One-Hundred Millions of Dollars)

■ PROJECTED PER CAPITA PERSONAL INCOME



(In Thousands of Dollars)

■ PROJECTIONS :

The Greenville area enjoys certain features which provide a sound basis for anticipating that some future growth will be generated by internal development forces. The greatest oportunities for future growth in the Greenville County economy lies in further development of manufacturing. For many reasons the oportunities for new manufacturing far exceed in magnitude those of any other sector of the local ecomomy. This is not to say that economic potential is restricted to this sector.

The county has excellent potential in future wholesaling distribution activities related to the expansion of manufacturers' sales offices and branches, warehouses for particular products, and regional distribution centers operated by manufacturing firms.

It is in the size and strenght of the local shoppers goods retail market - within the county itself - that the necessary support for extensive Greenville shopping facilities in recent years has been provided, and that in the future will help to expand Greenville's dominant retail position within the immediate region.

Downtown Greenville is still the highly specialized business district of the region, offering unduplicated services and facilities. The potential of the Greenville Downtown Area can certainly be developed further and many new private investments can be anticipated if the district's physical problems can be overcome.

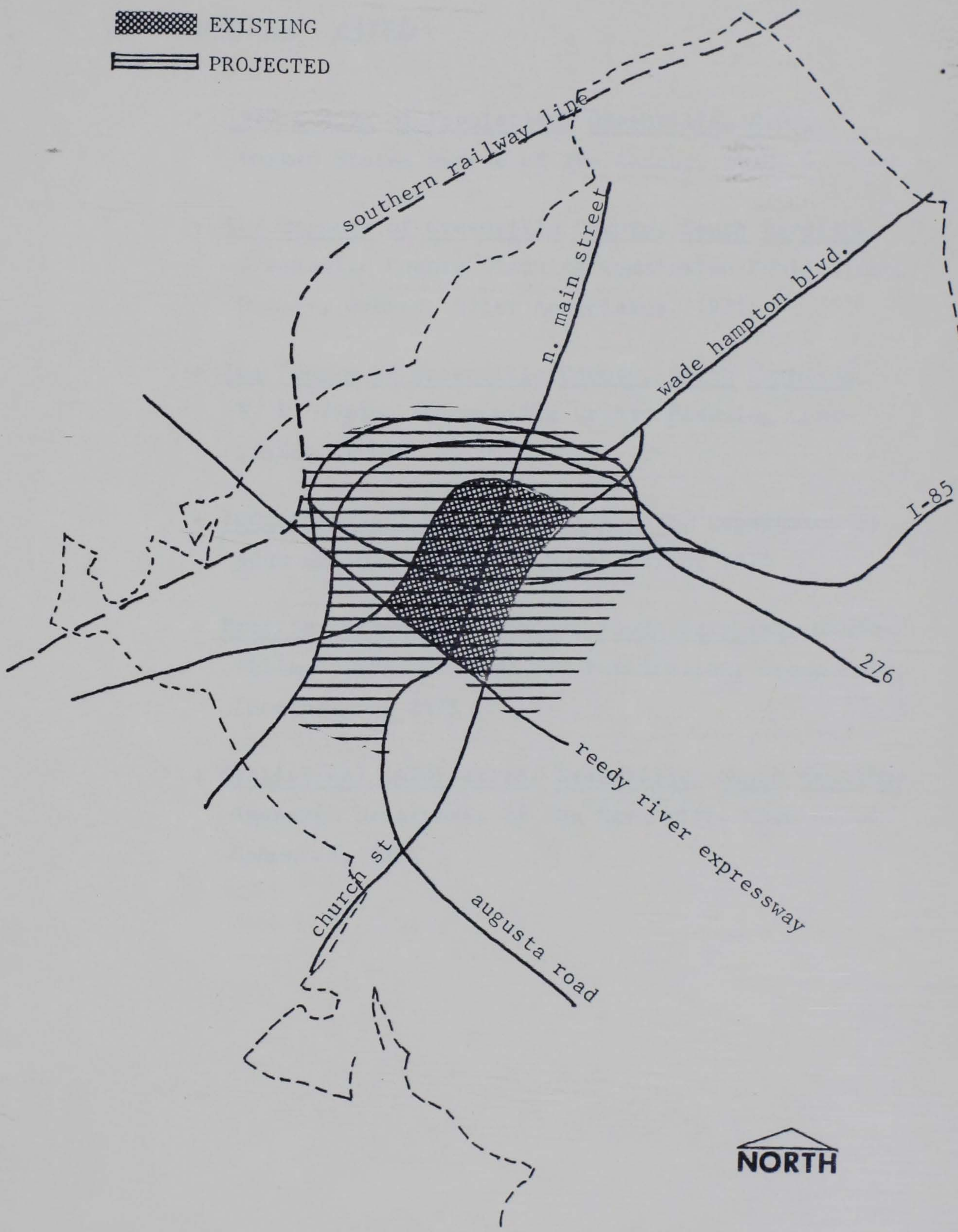
The future Greenville economy depends upon a

continuation of its advancing and specializing production and service functions as part of the new economy of the Southeast. Absorbing, servicing, and supporting a range of urban economic activities within its own boundaries and the adjacent counties of its immediate service area, the Greenville economy has developed a sufficient threshold to competence in what it offers to enable it to compete favorably with comparative sized urban complexes in the rest of the Southeast.

It is now expected that the Greenville-Pickens Region will be the centroid of a six-county region that will have a population exceeding one million people within the next fifteen years. The area will be a relatively high-cost urban community that will be capable of maintaining a wide range of first class municipal services over a large area.

EXISTING

PROJECTED



NORTH

■ PROJECTED URBAN EXPANSION

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GREENVILLE:
THE TRANSPORTATION PROBLEM

As was shown in the previous section on the City of Greenville, there has been a vast amount of expansion within the area in almost every aspect of the growing urban society. The increasing urban sprawl evident along major arterials within the metropolitan area has been met by a relatively inefficient and ineffective attempt by intra-city transport companies to keep up with area growth. As a result, many areas of the city are either seldomly serviced or totally without service by the system.

The inter-city transport services are also grossly inefficient. For an urban center to continue to grow, which is the desire of the City of Greenville, it must have excellent communication and transportation links with the world outside its territorial boundaries. At present, the inter-city transportation network, of which the City of Greenville is a major link, does not approach the necessary efficiency and adequacy to provide this level of mobility with areas outside its bounds.

A most important factor that must be grasped by the City of Greenville is that the existing problems will continue and will greatly increase. The gravity of the situation facing this area with a projected population of 500,000 people in less than twenty-five years is staggering. The task ahead will be one of building in three decades a new urban center nearly as large as the present one. Therefore, the transportation of the growing economy must be met effeciently and immediately to avoid new problems which have the capabilities of hindering growth.

The current lack of efficient and comprehensive transportation services in Greenville is the result of many factors. The conditions of the existing transport facilities and the low priority at which improvement is placed are basic problems. The following is a summarization of the transportation facilities in the Greenville area:

- The Greyhound Bus Terminal:

Of all the facilities within the city, this is by far the most acceptable. The terminal was constructed during the 1960's in the city center. Within the terminal all necessary provisions for passenger and baggage handling have been incorporated. The basic problem here is that due to recent downtown construction, and the re-routing of access roadways, the relatively new building has been isolated. The only bus access route must pass through the city causing further congestion to the already congested area. Also, as is the case with the other services, there has been no attempt to consolidate or connect with the other networks.

- Continental Trailways:

The facility from which this company operates is presently located at the intersection of East Washington Street and Laurens Road. The building itself is an abandoned gasoline service station. With the exception of a limited number of vending machines, there are no passenger facilities. The building is used as a stopping station and nothing more. Currently ther are no plans for expansion or construction.

- The Southern Railway Depot:

The Southern Railway Depot is located at the

west end of Washington Street at the intersection of Mulberry Street. The existing facility is outdated and deteriorating. The station house itself has been remodelled on the interior several times in the past twenty years to accomdate new equipment and increased personnel. The passenger waiting area has been lessened in order to create further office space. Still, three other buildings on the site are required to house all office personnel.

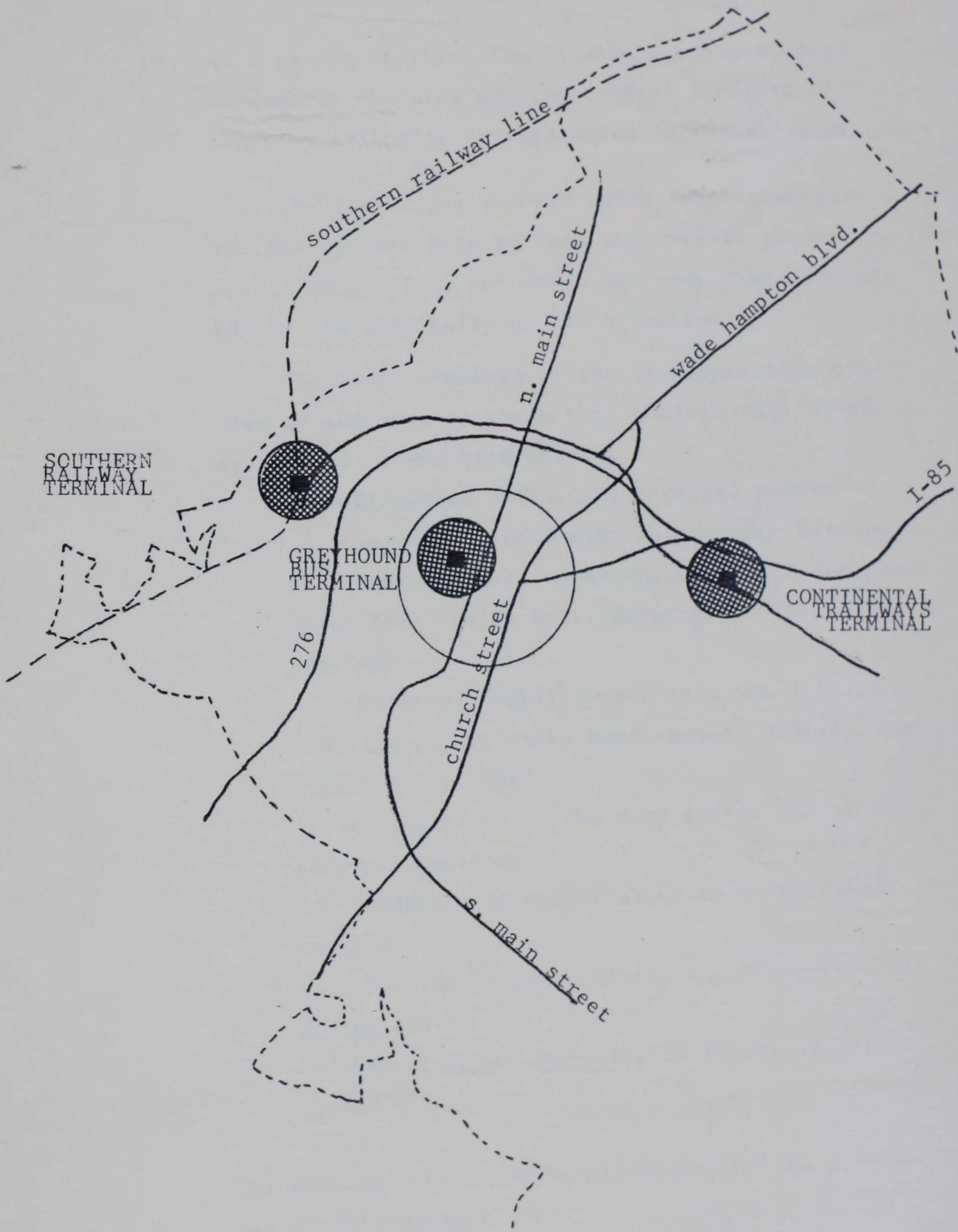
Once a major terminal for both passenger and cargo handling along the Southern Main Line, the facility now handles only limited passenger travel and even more limited cargo. Due to rail access to all major shippers in the area, the structures for the handling and storage of materials are no longer in use.

- The City Bus Line:

The City of Greenville operates a public bus transport system from a storage yard off of Hudson Street to the West of the city center. The facility is nothing more than a maintenance yard with office space. As there is no main terminal in the city center, off schedule and empty buses are forced to find parking room along the City's main street. This single factor results in visual pollution to the central business district, increased congestion along the downtown commercial spine, and increasing air pollution caused by excessive exhaust from poorly maintenanced vehicles.

- City Taxi Services:

Under the present system of taxi service, all transport is provided through individual companies.



■ EXISTING TERMINAL LOCATIONS ■

As a result of this, taxi stations are scattered throughout the area with no central location or singular authority through which to request service.

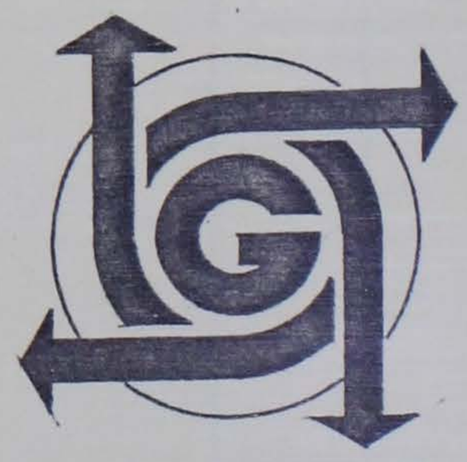
The facilities through which local transport systems operate help to feed the overall transportation problem, but there are many other factors add to the difficulty of the situation.

The basic elements of the transportation problem of the area to which this project will be addressed are summarized below:

- Dispersed intra-city terminal points
- Resultant difficulty in exchange between the transportation modes which hinders the passenger form taking full advantage of the services provided
- Difficult mobility for area non-drivers (children, physically handicapped, elderly, and low-income groups)
- Congestion: in the city center and at each terminal location
- Undeveloped potential of each individual service
- Decline of productivity resulting from all of the above
- No singular authority to coordinate services

The problems which may be alleviated by the proposals of this project are:

- A degree of relief of intra-city congestion
- Deteriorating public transport service
- Deteriorating passenger rail service
- High costs of transportation to the public



CONCEPT

■ CONCEPTUAL OUTLINE:

Once the problems of transportation in the Greenville area have been defined they must be analyzed to find how a transportation services center can best serve to alleviate some of those problems. It is from this analysis that a general concept is formulated.

- The incorporation of existing inter-city rail transport services and inter-city express bus service into a single facility would increase efficiency of interchange between modes and increase the convience to the patron.

- The incorporation of services into a single facility would allow efficient control of all transport modes by a single Transportation Authority within the boundaries of the city.

- Increased efficiency of interchange between modes would stimulate increased mass transit usage.

- Creation of a singular point of transient influx into the city complex would stimulate commercial activity in the area.

- Creation of a common link between all inter-city transportation modes and the intra-city bus service would enhance service of both.

- Linkage between all forms of transport would increase mobility of non-drivers within the area.

PROGRAM FORMULIZATION

■ FACILITY COMPONENTS:

The initial step toward programming a Transport-Services Center for the Greenville area was to analyze the existing problems in the area. From that analysis a general concept was formulated, and from that concept a decision as to what facilities should be incorporated into the Center was made:

- A Rail Passenger Transport Facility for Southern Railway

- An Express Bus Passenger Facility for the Continental Trailways Company and the Greyhound Bus Line.

- A Heliport to accomodate a shuttle craft to and from the Greenville-Spartanburg Jetport and the Greenville Municipal Airport.

- An exclusive means of transport connecting the downtown urban center and the proposed transportation facility.

- A maens of connecting the major inter-city transport lines with the Greenville City Bus Line and existing taxi services.

Once the general outline for components of this Transportation Services Center had been defined, design criteria for the individual components was examined.

■ RAILROAD STATIONS

The railroad station has been a part of this society for longer than any other type of transport facility. Its appearance on the land has symbolized economic and population growth for over one hundred years. Once the railroad was the only rapid means of transport for passengers and cargo across the land, in almost every city in the country. It has only been in the past few decades that the old railroad depot at the end of town has become a massive building with trucks and cars and people flowing in,around, and through it twenty four hours a day. Express bus services, airplanes, and the ever present automobile have made an attempt to put the rail service out of business, yet it still remains a relatively inexpensive, fast, and pleasurable mode of transportation.

Modern technology has given the railway terminal a new look, and many new an fast means of functioning. However, the basic function is to serve the transit patron before and after using the rail transport system.

There are a number of basic considerations to deal with in planning and designing a rail terminal building. The basic element in the design is the rail track itself. Due to the design of the rail vehicles and the rails themselves, the passenger platform is forced to take a linear configuration. In computing platform dimensions, it is necessary to have a working knowledge of the size and type of passenger trains that will be serviced by the terminal.

It is always advisable, except in the larger terminal buildings where a great number of vehicles

are serviced at once, to allow the patron access to the platform from a central point along the platform. This generally affords the patron the shortest travelling distance from the cental concourse area to the transport vehicle.

There must be sufficient allotment of space for ticketing and baggage handling. These areas are most functional if related to both the entry and departure areas in such a way as to maintain a relatively unobstructed flow by patrons in the facility.

The waiting area within the railway station has always been the central focus of the building. This design has been changing over the past years. The waiting area is still a most important space, but planners now feel that the uninterupted flow of people and baggage is the prime concern. Therefore, the waiting area should be located along the main concourse area and should relate to all patron service areas within the building.

The support facilities for the terminal and the passenger change with the individual needs of a particular station. Generally they fall into the following categories:

1. Patron Service:

   Restrooms, Telephones, Shops, Baggage Storage, Vending/Concession area, Information

2. Terminal Service:

   Ticket Office, Yard Office, Staff Areas, Superintendent's Offices, Maintenance, Equipment.

■ BUS TERMINALS

The growth and development of bus transportation has closely followed advances in the automotive technology in this country and the improvement and expansion of the national highway network. The first bus routes were originated by individual entrepreneurs using converted passenger automobiles. These routes were short and service was generally unreliable. As the highway network expanded and more suitable bus equipment became available, these short disconnected route were merged into larger consolidated operations providing more reliable services over longer distances. Our modern express highway system and efficient high-speed buses have made bus transportation the leading means of public transport in the United States. Over the past decade, bus services have evolved into several general categories and characteristic terminal types.

1. Inter-city Bus Terminal:

The inter-city terminal is usually found in the downtown core of the city and is accessible by local transit, taxi, and auto. It differs from other terminal types in that it includes long haul services in excess of several hundred miles, and also provides for a much greater number of bus movements. Land costs normally dictate that the design incorporate the capabilities of verticle expansion in the denser city areas.

More elaborate package express facilities are provided in the inter-city terminal and a greater amount of concession and rental space is provided to defray the higher costs of terminal construction and operation.

2. Airport-City Bus Terminal

The airport-city bus terminal provides primarily for the transportation of airline passengers from an urban center to the major airports it serves. Usually located in the urban center, the terminal is accessible by local transit systems, taxis, and private automobile. Oriented to the departure and arrival of air transport flights, the terminal normally has provisions for arrival and departure flight information as well as ticket purchasing and check-in facilities.

3. Urban-Suburban Commuter Terminal

This type of facility may be located within the downtown core, as a passenger collection and distribution point, or on the periphery of the core as a rapid transit feeder station. It is generally characterized by a diversified bus route structure and a high-turnover commuter-type bus operation. Bus accessibility is an important factor. Grade seperated access by underpass or overpass connections and exclusive bus lanes on connecting highways are desireable to maintain schedule efficiency.

General functional organization of the terminal is usually determined by the site configuration, the volume and type of bus operations, and passenger and bus traffic circulation. Although all terminal types to some extent share the same planning problems, there exists some significant differences in design rationale.

One of the most complicated terminals is the inter-city type, since it is often found in a dense

developed area in the heart of the central city, and it generally is inhibited by existing construction and high land costs. Moreover, the underlying design rationale should maximize the provisions for short lines of flow and communication between ticketing and baggage functions and the bus interface.

An island plan with the functional elements radiating from the core allows for maximum efficiency. Such a relationship would allow the waiting areas to serve as a central focus point, with all bus berths being equidistant. As the terminal becomes linear in plan, it becomes necessary to implement other means of passenger flow for maximim efficiency.

In the planning of high-volume commuter bus facilities the design is controlled more by the bus and passenger volumes, traffic circulation, and the resultant space demands for larger numbers of bus berths, while baggage handling provisions are minimal. These space standards may dictate a vertical, multilevel solution, with intermediate passenger circulation concourses. Traffic access, by direct exclusive highways on the bus side and by feeder transit, auto, and taxis on the passenger side are importantelements of this type of terminal.

Generally, with regard to the airport-city terminal, the primary planning considerations include provisions for efficient check-in facilities, baggage handling, and flight information. Moreover, counter space requirements are usually more extensive and should include weigh-in provisions and conveyors for handling baggage. Adequate provisions should also be made for limousine, auto, and taxi access.

All terminal requirements should provide for

ticket sales, vending machines and/or small snack bar, toilet facilities, trash collection, offices, baggage and/or storage room.

■ HELIPORTS

Heliports are classified to indicate the major differences in the kinds of installations for helicopter operations. The differences lie mainly in the use, the types of helicopters used, and the nature of supporting facilities included in the heliport. This is mainly to aid in the planning and zoning for heliports and to relate the operational factors involved in land use considerations.

A heliport is considered public or private, depending upon whether or not it is used for public transportation. The type of ownership has no influence on the classification of the facility, only the type of helicopter operation determines the classification.

The supporting facilities fot the heliport may include passenger and/or cargo handling, helicopter parking, fueling, and maintenance provisions.

Heliports are classified as follows:

Class I - Private
Class II - Public (small)

Class III - Public (large)

They are further sub-classified according to their available support facilities.

Subclass A - Minimum support facilities; no buildings, maintenance, or fueling
Subclass B - Limited support facilities; no maintenance or fueling
Subclass C - Complete support facilities including maintenance and fueling

The selection of a heliport site involves four main considerations: (1) The desired location and physical layout; (2) operational safety; (3) the effect on navigable airspace; (4) the effect on the surrounding communittee.

There are several design considerations to be explored. Although ground level sites are the least costly and normally provide the easiest access to the individual or individuals using the facility, rooftop or other elevated structures can reduce or elimate the problem of further land acquisition and frequently provide better flight access to the heliport.

Short-haul markets demand that major consideration be given to timesaving and convenience for passengers; otherwise, the benefits of the helicopter mode of transportation will not be fully realized.

There are many advantages to rooftop heliports. Privacy of the heliport site, quick access to the upper floors of the building, and more open flight routes are some of the reasons why a rooftop or elevated heliport may be preferred.

In planning rooftop heliports, it is important to consider local building codes regarding construction, occupancy, use, egress, and fire regulations. Also, one must consider rooftop construction such as elevator shafts, penthouses, air conditioning towers, etc., on the approaches to the heliport.

Heliport landing areas, and the supports for them, on the roof of the building should be constructed of fire-retardant material. Landing areas should be designed to confine any flamable liquid spillage to the landing area itself, and provisions should be made to drain any such spillage away from any exit or stairway serving the helicopter landing area. Also, guardrails should be provided

in compliance with the applicable handrail provisions of the local building codes.

A ClassII, Subclass B heliport should consist of the following:

1. Landing and take-off area
2. Peripheral area
3. Patron access to and from landing surface

Using the spatial requirements of the individual components of the proposed facility, as stated in the section on planning criteria, as a base and consolidating them, a single comprehensive outline program for the Transportation Services Center was compiled:

■ PROGRAM REQUIREMENTS:

1. Passenger Concourse Area*
2. Information Areas
3. Ticketing Areas*
4. Baggage Handling Areas*
   A. Baggage Check Areas
   B. Baggage Claim Areas
5. Waiting Area(s)*
6. Patron Convenience and Concession Areas*
   A. Restrooms
   B. Customer Service Areas
   C. Telephones
   D. Newstand(s)
   E. Shops
   F. Restaurant
   G. Lounge(s)
   H. Showering and Dressing Areas
   I. Vending Areas
7. Office and Staff Areas*
8. Platform Areas*
   A. Rail Transport Platform
   B. Inter-city Bus Platform
   C. Heliport
9. Patron Drop-off and Pick-up Areas
10. Patron and Staff Parking Areas
11. Vehicle Servicing
12. Mechanical Equipment Area and Servicing

■ PASSENGER CONCOURSE AREA

The passenger concourse area is the space within the terminal building which is designed to accomodate patron circulation to all other areas intended for patron usage. Within the terminal the main concourse should provide free passenger movement from the main entrancs and secondary entrances to the ticketing area and baggage handling areas and through to the gate or gate concourses. The directional flow should be apparent or should be indicated by some type of visual means. It is most advisable for the concourse area to be as unobstructed as is possible, enabling free movement of large number of transients to different points within the building at the same time.

The concourse should be physically linked with all other areas of patron usage such as information areas, waiting areas, and patron convevience and concession areas.

It is also advisable that the concourse be at least visually linked with various staff offices and staff areas. Reasons for this visual connection are security, surveillance of activity necessary for efficient serviceability of the transportation center to the transient, and rapid evaluation of station activity.

■ TICKETING AREA AND BAGGAGE HANDLING

The ticketing area should be located near the entry or entries to the terminal building for passenger convenience. However, the relationship between the entry and the ticketing area should be such that

there is no crowding by patrons purchasing tickets around entry and egress points.

It is also advisable to provide some form of automatic ticket issuance to handle the short and routine trip desires which are common within the region to be served by the local transit network and the transportation center.

The ticketing and baggage handling may be combined to make the process of baggage checking and ticket purchasing more convenient to the passenger. Although this arrangement benefits the transit patron with baggage, this design must consider the patron without baggage. The baggage checking area should be located close to the ticketing area and thus relate to the flow of patrons to the boarding areas. The baggage claim area should naturally relate to the flow of patrons from the deboarding areas.

- PATRON WAITING AREAS

The first consideration in the planning and design of the waiting areas is patron comfort and convenience. It should be noted that this area will be used by both transients and non-transients. The waiting areas should be located at a point or points in the terminal building that relates to the concourse and departure areas. The use of a singular waiting space is completely acceptable if the physical relationship of areas requiring this space are such that this consolidation would retain the convenient proximity to the activity areas served.

The waiting area should be located adjacent to, but out of, the flow of patrons through the terminal.

■ PATRON CONVENIENCE AND CONCESSION AREAS

Restrooms, customer service, telephones, newsstands, shops, showers and dressing areas, lounges, restaurant, and vending areas are considered in this broad category.

Restrooms should relate to all spaces within the terminal paying particular attention to patron flow to and from platform areas and patron flow in relation to the waiting areas. In some plans it will be possible to consolidate all restrooms into a single area without sacrificing convenience to the patron.

Telephones and newsstands should relate directly to the main passenger concourse and to the patron waiting areas. This relation allows easy access to the patron with little time before boarding the transit vehicles.

Shops may also relate physically to the concourse area; however, care must be taken to avoid disruption of patron flow to and from departure areas by those using the shopping facilities.

Generally. if there are a number of different shops, it is only the patron with an expected waiting period of considerable length that will use these facilities. For this reason, it may be advisable to only visually link the concourse with this space, allowing shopping and consequential socializing to occure off the main concourse area.

As the facility will probably accomodate many transients on lay-over between scheduled trips, it is necessary to provide for their use a space for showering and dressing. A close relationship to the movement of people to and from the transit vehicles is not necessary or desirable. Also in this space there should be lockers provided for patron usage.

A lounge or lounges and/or a restaurant may be located near the passenger concourse; however, due to the nature of the activity in the area, it is acceptable to physically disassociate the two areas. If this is done, there must be easy access to and from the concourse area provided.

■ OFFICE AND STAFF AREAS

The rail and express bus transport companies involved in this facility should be given adequate office and staff facilities. This can be accomplished by giving seperate spaces to each authority, or by providing a common office and staff space. These area should be easily accessible for all staff personel but should be situated where inter-office traffic will not conflict with patron flow.

Within the facility there should also be provided space for the local governing transit authority. Office and conference space should be alloted along with an area designed for public relations.

■ PLATFORM AREAS

The platform areas are those areas where the transport vehicle docks and all patron boarding and deboarding occurs. It is essential that all patron flow to and from this area and the main passenger concourse be as easy and fluid as possible.

Because of the need for patron safety and terminal security, the platform should be accessible by the public from a singular control point.

■ CHECKLIST FOR FACILITY PLANNING:

- LOCATION OF TERMINAL BUILDING
- AUTOMOBILE AND BUS CIRCULATION
  - Access roads to and from terminal
  - Parking areas
    taxi
    limousine
    private auto
    rental auto
    shuttle bus
    express bus
  - Passenger vehicle loading and unloading
  - Mail, express cargo, and service road
- BUILDING TYPE
  - Piers or concourses; single level, multi-
  - level
  - Provisions for expansion and flexibility
- PASSENGER HANDLING
  - Passenger circulation flow
  - Ticket counter relationship to entrance
  - Ramps, stairways, escalators, elevators
  - Loading devises
  - Passenger protection outside terminal
- BAGGAGE HANDLING
  - Baggage conveyors
  - Traffic flow
  - Baggage check area
  - Baggage claim area
- BUILDING INTERIOR
  - Rail and express bus offices and ticket areas
  - Transport authority offices
  - Spectator concourses, waiting areas, restrooms
  - Concessions

- Equipment and systems
  - heating
  - ventilating
  - electrical
  - lighting
  - plumbing
  - conveyors

■ MAINTENANCE AND MISCELLANEOUS FACILITIES

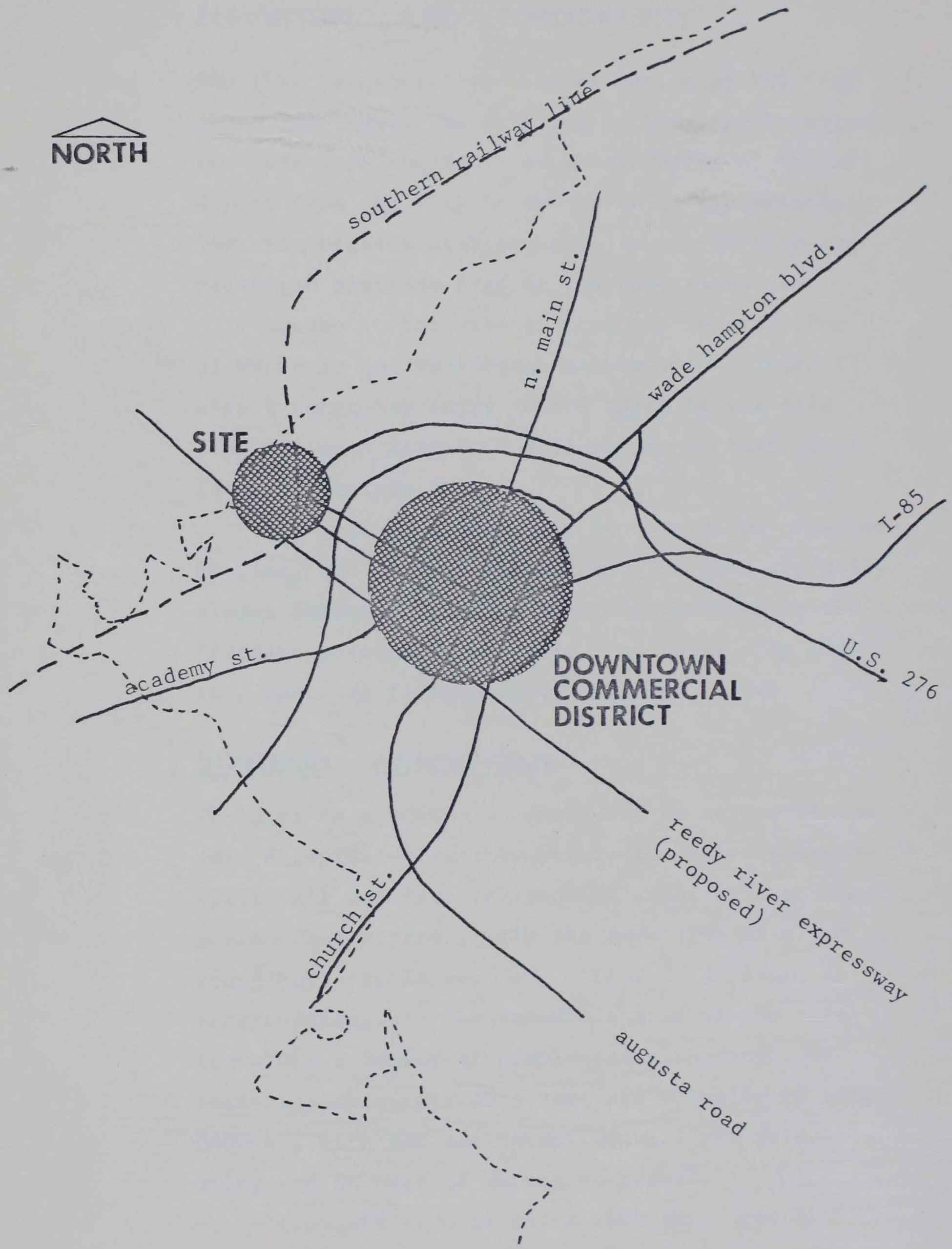
- Comissary, shop space
- Sewage disposal
- Storage facilities

SITE INVESTIGATION

• LOCATION :

The site for the proposed Transportation Services Center is situated in the Western sector of the City of Greenville almost at the boundary of the City. The land area which will be considered as the immediate site is, generally, located at the intersection of West Washington and Mulberry Streets, the present location of the Southern Railway Depot.

More specifically, the site is bounded on the West by the existing railway tracks extending from a point approximately 300 feet downline from the rail overpass of Washington Street Extention, to the Northern-most point of the existing Southern Railway property at the Highland Street bridge. The site is further bounded on the East by Cook Street. For the purposes of this project, an assumption has been made as to the approximate location of the new Mulberry Street/Stone Avenue highway, and the Southern boundary of the site will extend to this artery. This means the incorporation of the land 150 to 200 feet beyond the existing Mulberry Street line.



■ SITE LOCATION

• ELEVATION AND TOPOGRAPHY

The site is generally at an elevation of 960 feet above sea level. The existing railway tracks enter the site from the South at an elevation of 960 and depart from the site to the North at approximately 964. The present station house is at 960 with the passenger platform area at the same elevation.

Access to the site is from the intersection of Mulberry and Washington at about 954. There is also a secondary entry to the north of the site from Railroad Street. The elevation at this point is approximately 964.

The site as a whole can be considered relatively flat, and without vegetation. The land gradually slopes downhill from the existing terminal to the Southern portion of the site. The total drop over this space is fifteen feet; from 960 to 940.

• BUILDING CONDITIONS

The area as a whole is considered to be one of the most delapidated sectors within the City of Greenville. All existing residential structures on the surrounding streets, with the exception of a few along Mulberry Street, are either delapidated or deteriorating. In the immediate area of the site there are a number of commercial structures. Of these approximately 80percent are actually in use. However, with but one exception, all are deteriorating and in need of extensive repair.

It should also be noted that this area has been slated for possible future urban renewal.

▪ SITE CONSIDERATIONS

Having selected the actual site for the Transportation Services Center, ther are many factors that must be taken into consideration which may either directly or indirectly effect the ultimate design of the facility upon the site. Some of these physical factors are listed and discussed below:

▪ Existing Railway Tracks:

The location of these tracks will possibally have great influence on the physical design of the facility due to the physical and economic restrictions of moving or removing track. Also, due to the proximity of the rail overpass, there will be somewhat of a restriction placed on the distance to the South of the existing structure that a new passenger platform or platforms can be located in the proposed facility.

▪ Proposed Alterations to West Washington and Mulberry Streets:

Upon the execution of the proposals for these two arteries, the overall traffic circulation pattern to and from the site in the direction of the city center will be changed. West Washington, becoming the North-bound artery will then become the only feeder motorway into the site directly from downtown. This in itself could have a major effect on the possible entry and exit points along the site.

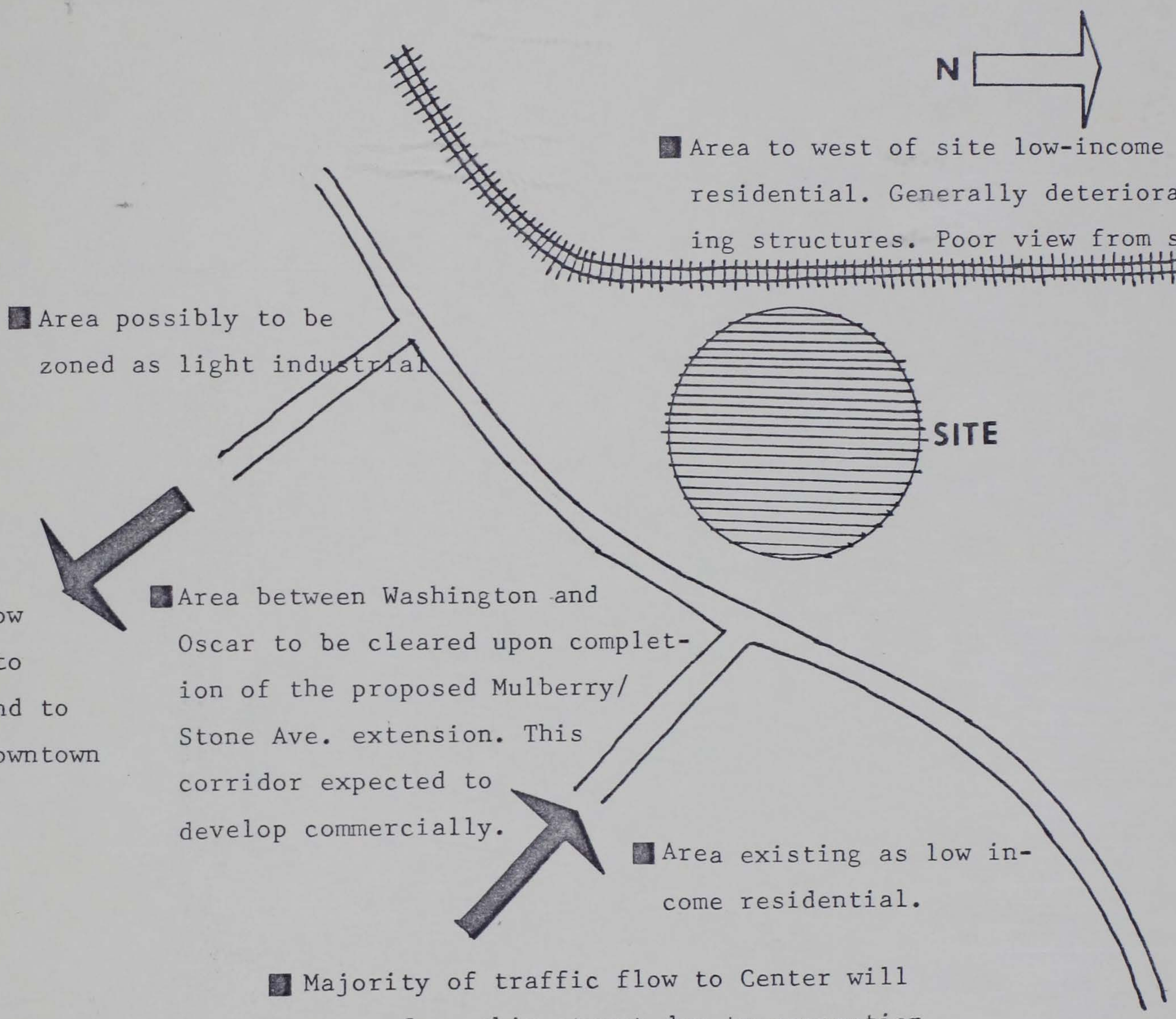
▪ Proposed Mulberry/Stone Avenue Extension:

Upon completion of this highway, there will be a major means of rapid access to both the proposed new downtown loop freeway and the proposed Reedy River Expressway. This is of major concern in the

consideration of access route for the Express Bus Network that will be located in the new facility. Also, consideration must be given to the amounts of traffic that will pass by the site in order to plan for traffic control points along the site if necessary.

- Surrounding Areas:

Consideration must be given to the visual surroundings of the site. Decisions as to how or whether to buffer certain zones such as residential areas, possibally the orientation of the entire Center will stem from careful evalutation of the area.



SITE CONSIDERATIONS

BUILDING ANALYSIS

▪ SCOPE:

Proper definition of the scope of the specific problem, A Transportation Services Center, depends initially on the establishment of the following assumptions:

That all planning of transportation development will be undertaken by a City Transit Authority with governing power over all transportation modes within the boundaries of the City.

That all land include in the site for the Transportation Services Center can be obtained by that Authority.

That the building development will be undertaken by a corporation of private interests, only after the planning is initiated by the Transit Authority.

The actual design solution will be confined to the platform areas of both rail transit and express bus transit, the terminal building proper, the associated parking structure, the heliport structure, and the immediate site development.

It should further be noted that future urban center expansion in Greenville which is predicted to move Westwardly, could be highly influenced by the design and development of the Transportation Services Center.

■ FUNCTIONAL ANALYSIS:

The prime functional concern in this design is the efficient service of more than one transportation system within a singular structure. It is the degree of efficiency relative to this problem that ultimately determines the success of the transportation center.

The basic transit center design solution must be characterized by an extremely functional pedestrian circulation pattern, and at the same time provide for a harmonious relationship between transport systems.

First, in order to create the desired relationship between services, the design must be such that interference of one function with another be eliminated. The train and bus platforms are the most basic element of the transit station. The number of cars expected per train and the number of buses expected to be serviced at one time will determine the respective sizes of the platforms. These two basic components afford a basis for the overall configuration and relative size of the facility.

Having seperated the two services as desired, consideration is given to the circulation patterns between the two. In the consideration of patron circulation, priority must be given to the passenger entering the center. Once this pattern is established, the other pattern will follow from it.

Horizontal circulation being one governing factor, in a multi-level design, consideration must also be given to vertical circulation patterns. For that reason there will be extensive use of escalators, stairs, and elevators throughout the terminal. Conceptually, the majority of the verticle circulation

by patrons will be accomplished with the use of escalators. The elevators will primarily function for staff usage, use by the handicapped and the elderly, and use by patrons from parking areas with excessive amounts of luggage.

Supporting facilities for the transportation center services will include sufficient office space for staff of both rail and bus services and space alloted for the local Transit Authority. These areas are to be designed for flexibility and efficiency, anticipating future changes or reorganizations of the transport services.

A center of this size may also require a medium to large restaurant facility. With the vast diversification in passenger usage of the center, it will be necessary for this establishment to have the capabilities of servicing a wide cross-section of patrons.

Remaining commercial and office spaces within the center will be leased to private interests. It is expected that these facilities will need to be of the impulse shopping type in order to operate efficiently. It is totally feasible that a terminal of this size with large quantities of patrons can relatively easily support a number of these commercial establishments.

■ STRUCTURAL ANALYSIS:

The structure of the Transportation Services Center is basically a rigid frame steel-reinforced concrete system. The selection of this particular system was made on the basis of many considerations.

■ Within the parking structure and certain parts of the terminal proper, a concrete structural system would function most efficiently for underground construction.

■ From this it follows that the application of the same or similar system throughout the building would afford a more homogeneous solution.

■ The flexibility of concrete can be well applied throughout the station in retaining walls, slabs, floor systems, beams, columns, etc.

■ The inherent mass, stability, and potential for a variety of surface treatments and textures can be of major advantage in the control of noise isolation.

■ Concrete, possibly above all other materials, has the potential for a variety of aesthetic treatments.

The entire complex will be designed over a grid of twenty feet by tweenty feet. Spans, of course, will vary from area to area with the greatest spans occuring in the parking structure. The platform area which services the rail transport vehicles, may require spans up to 80 feet if central interior column supports are not used.

The basic floor system will be a pre-stressed concrete structural double-tee supported by reinforced concrete columns. The exceptions to this sys-

tem will occure on the lower level of the parking structure and of the terminal building proper where a slab on grade will be employed.

Partitions within the terminal building will be kept to a minimum with all partitions on office level(s) being removeable to allow for future expansion or reorganization.

▪ MECHANICAL ANALYSIS:

The function or functions within a structure gennerally dictate the selection of a certain type of mechanical system. In addition to function there are other elements which contribute to the requirements of a particular system. Such elements include the site orientation, amount of glased area with relation to the amount of unglazed area, the types of materials used in construction, the number and type of activity of persons that will use the facility, and the general area climatic conditions.

For reasons of economy of construction and relative freedom of architectural design, a mechanical system that will minimize the lengths and size of ducts, pipes, and other related equipment and machinery should be developed. Therefore, assuming that all areas to be enclosed shall be climate controlled, the terminal building will be served by a verticle mechanical service core that will feed horizontally to each level.

A multi-zone, double-duct system of forced hot and cold air will be use to control temperatures along the perimeter zone of the building. This system will allow for perimeter treatment to compensate for heat loss and heat gain. A single-duct temperature control system will be employed for the interior spaces of the building.

Also within the limits of the climate control system will be a plexiglass covered horizontal transport tube above grade which will connect the parking facilities with the terminal building.

As the parking structure will be partially underground, electrically operated ventilating fans

will be used on the lower level(s) with intake occuring naturally from the South end of the structure and through openings along the passenger central corridor. The exhaust will occure in the center and along the sides of the structure a appropriate distances.

▪ AESTHETIC ANALYSIS:

The basic architectural concept influencing the design of this structure is that as a transportation focal point where people and machines are constantly in motion, an outward expression of these functions seems to be appropriate. This entails a harmoneous functioning relationship between the plan, section, elevation. and perspective design of the center as a unit.

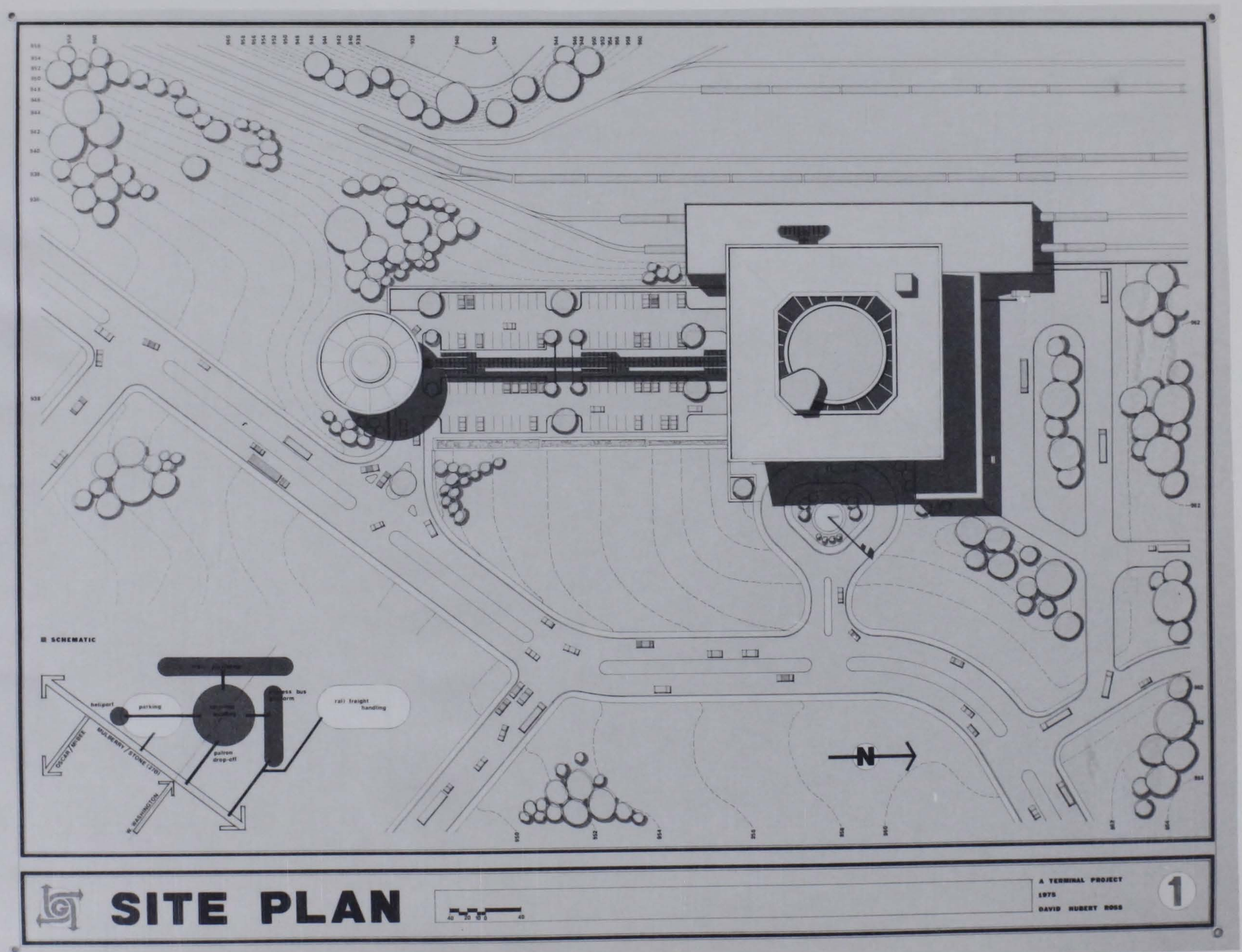
It should also be taken into consideration that as a focal point for all area transportation systems, especially inter-city transit, this building will be the initial architectural statement viewed by a transient when entering the City if Greenville. For that reason it must be a sourse of community pride in order to achieve ultimate success.

Yet another major factor which effects design is that this structure will be the first, and at least for the present, the largest edifice within viewing distances around the site. This alone places emense responsibility for success on the designer.

Finally in relation to exterior appearences, the structural system to be used cannot be disregarded. The desire for free and fluid interior space will have a tremendous effect on the final outcome of the building exterior.

The success of the interior of the terminal will depend mostly on detailing, lighting, and a well developed system of graphics throughout.

VISUAL PRESENTATION



SITE PLAN

A TERMINAL PROJECT
1975
DAVID HUBERT ROSS

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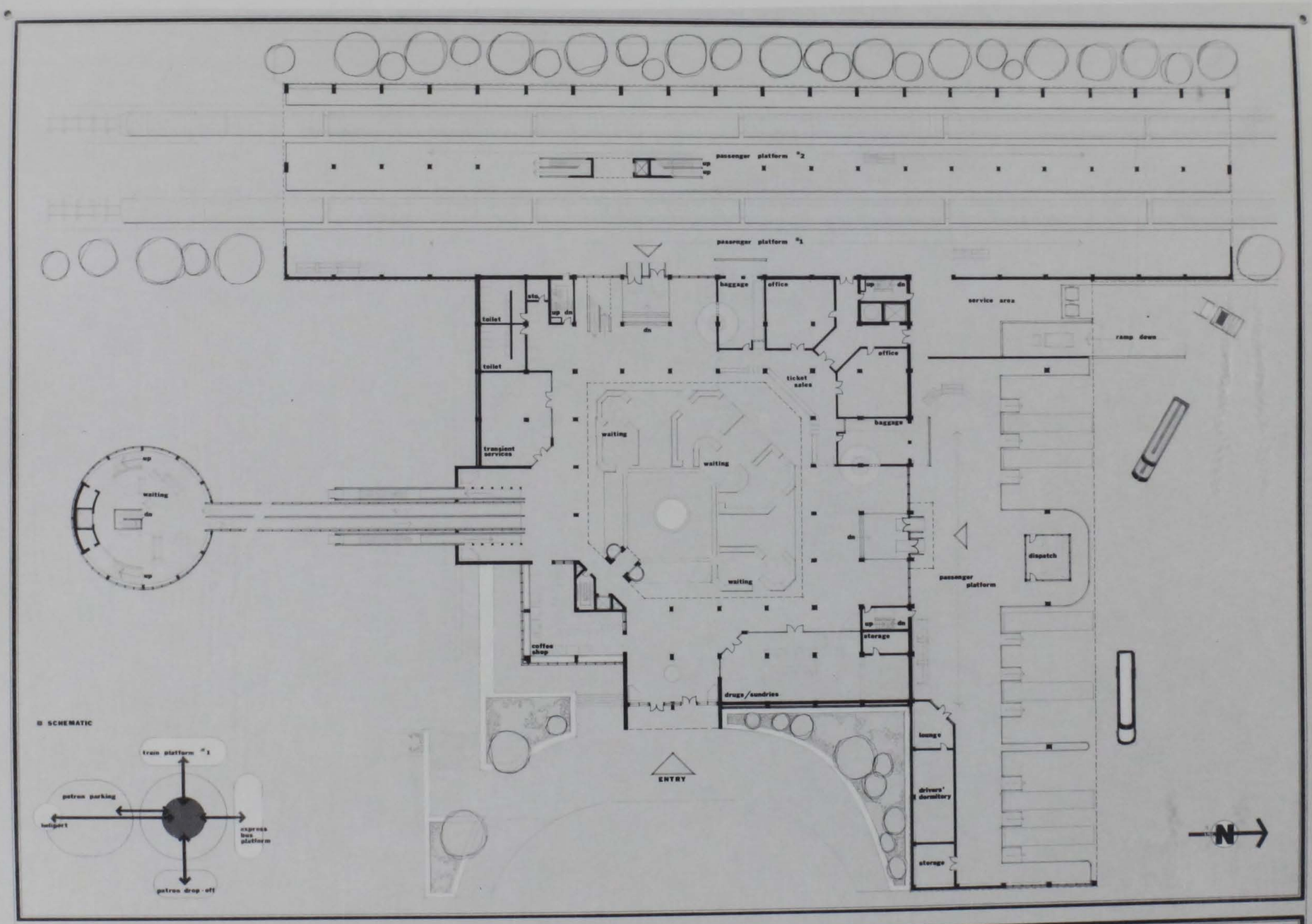

PLAN: 1ST FLOOR

A TERMINAL PROJECT
1975
DAVID HUBERT ROSS

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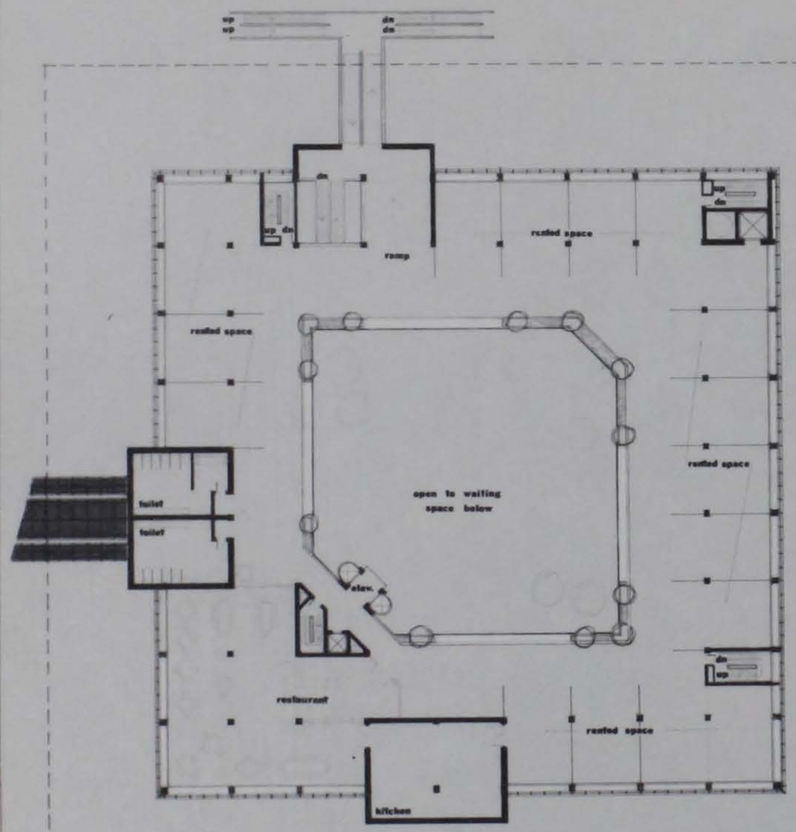
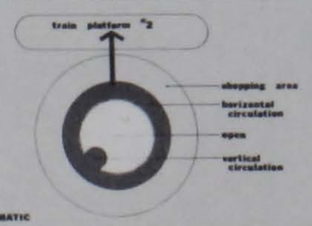
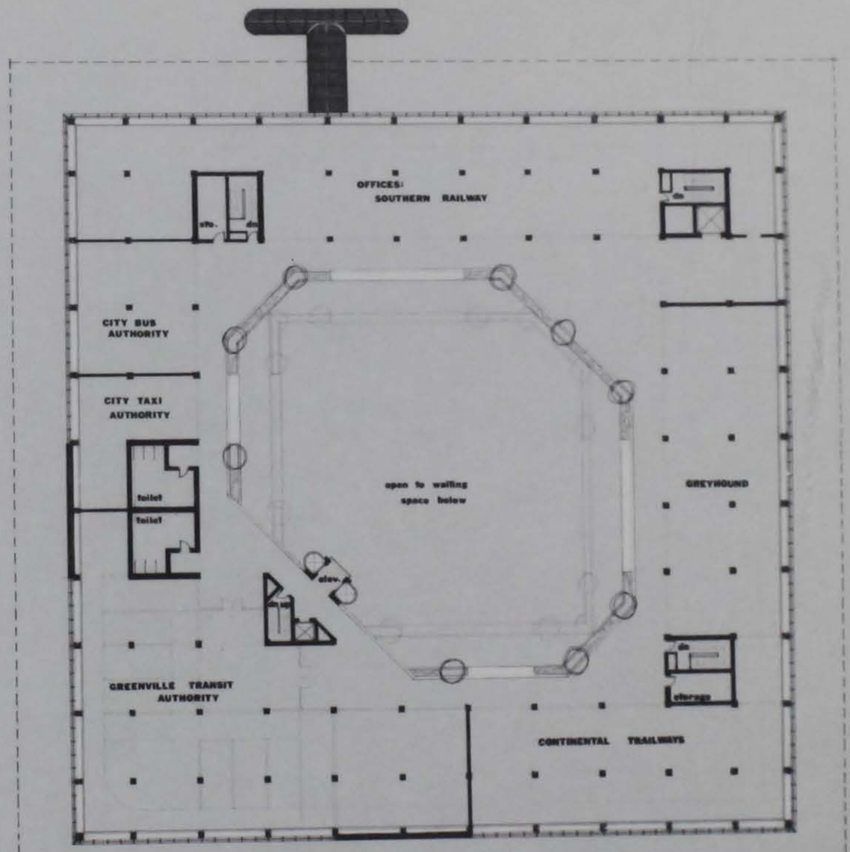


SECOND FLOOR ■

PATRON SERVICES

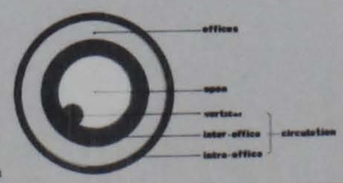


■ SCHEMATIC



THIRD FLOOR ■

TRANSPORTATION OFFICES



■ SCHEMATIC

PLANS: UPPER FLOORS

A TERMINAL PROJECT
1975
DAVID RUBERT ROSS

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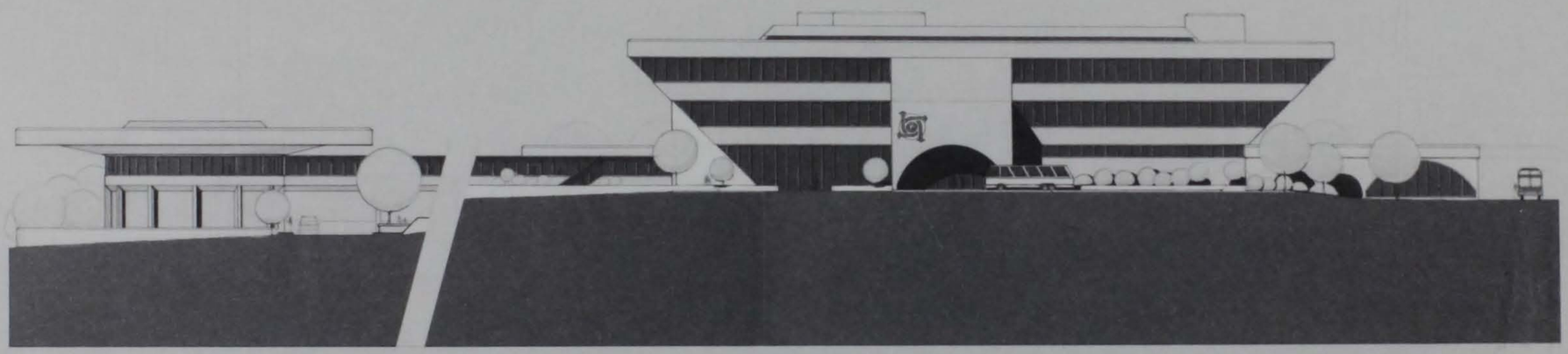
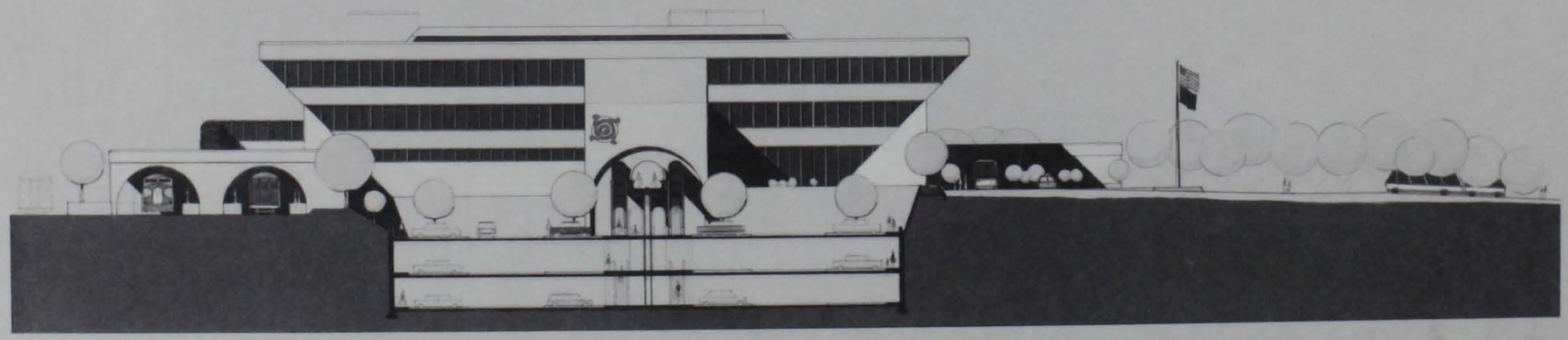


■ EAST ELEVATION



■ SOUTH ELEVATION

ELEVATIONS

A TERMINAL PROJECT
1975
DAVID HUBERT ROSS

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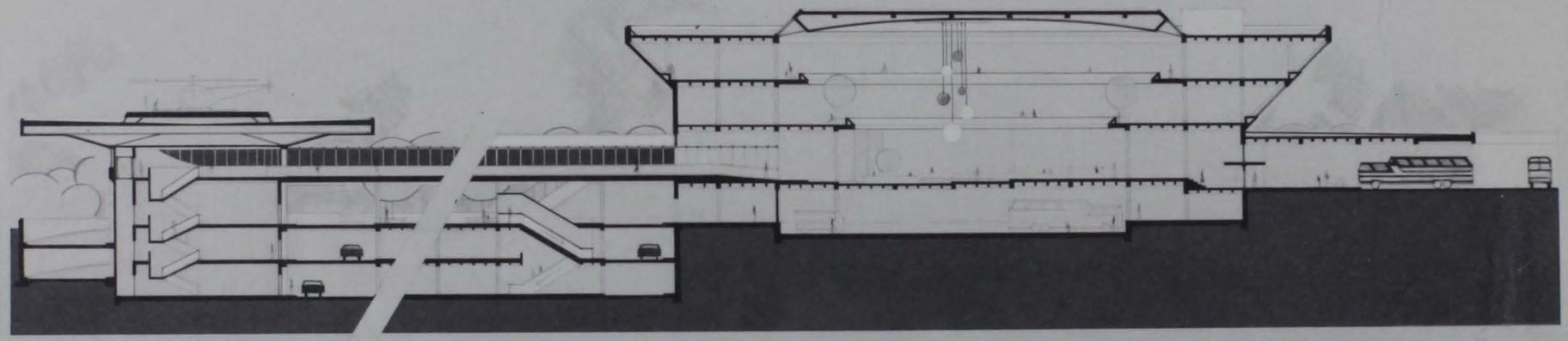
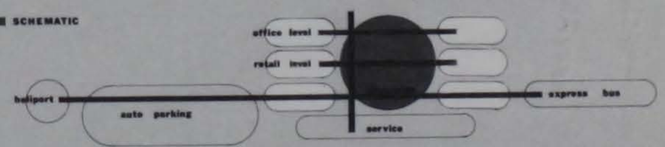
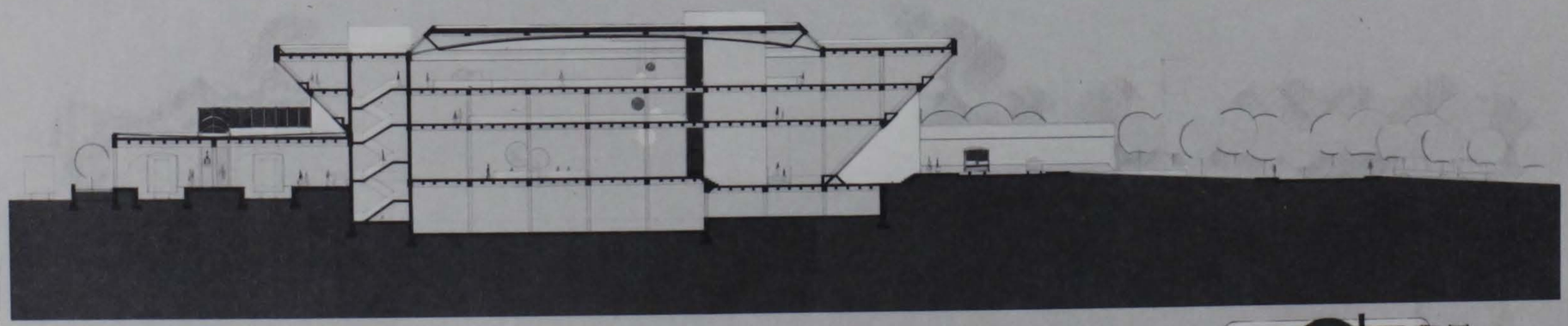


SECTION A·A

SCHEMATIC





SECTION B·B

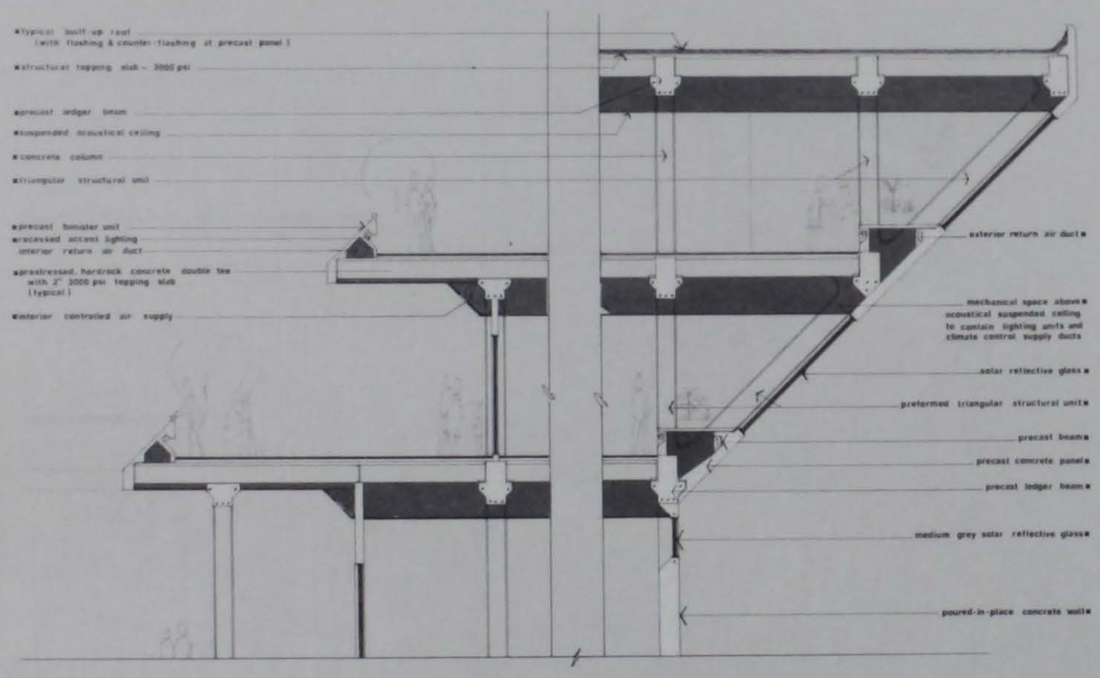
SCHEMATIC

BUILDING SECTIONS

10 5 0 10

A TERMINAL PROJECT
1975
DAVID HUBERT ROSS

5



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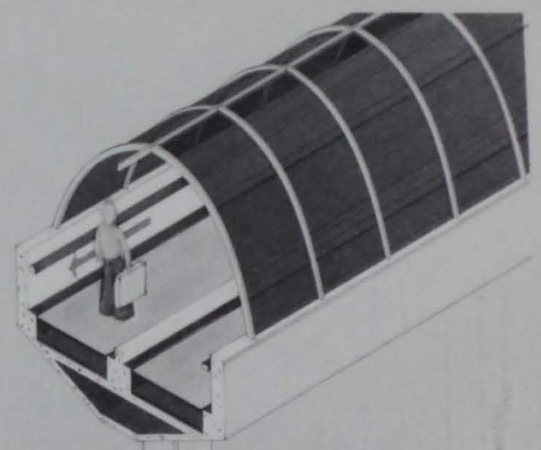

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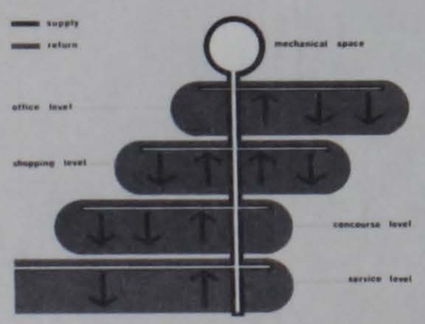

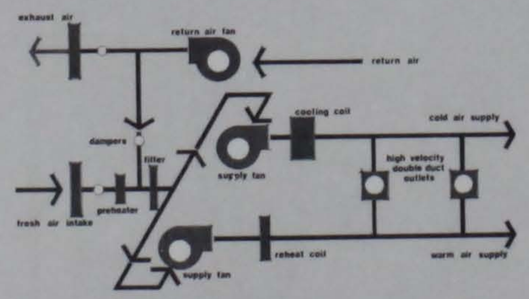

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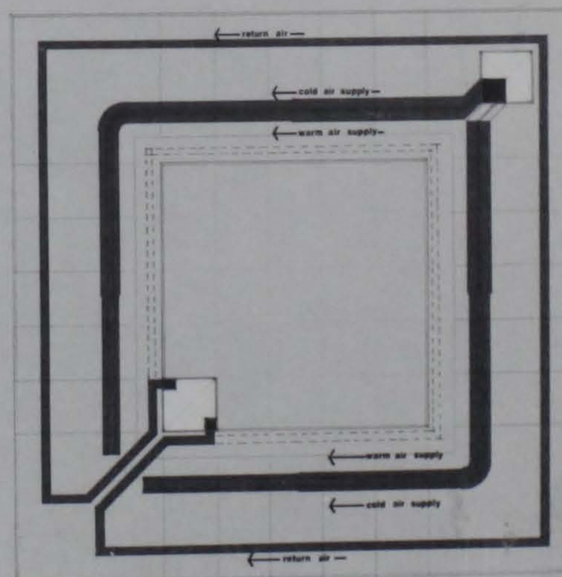
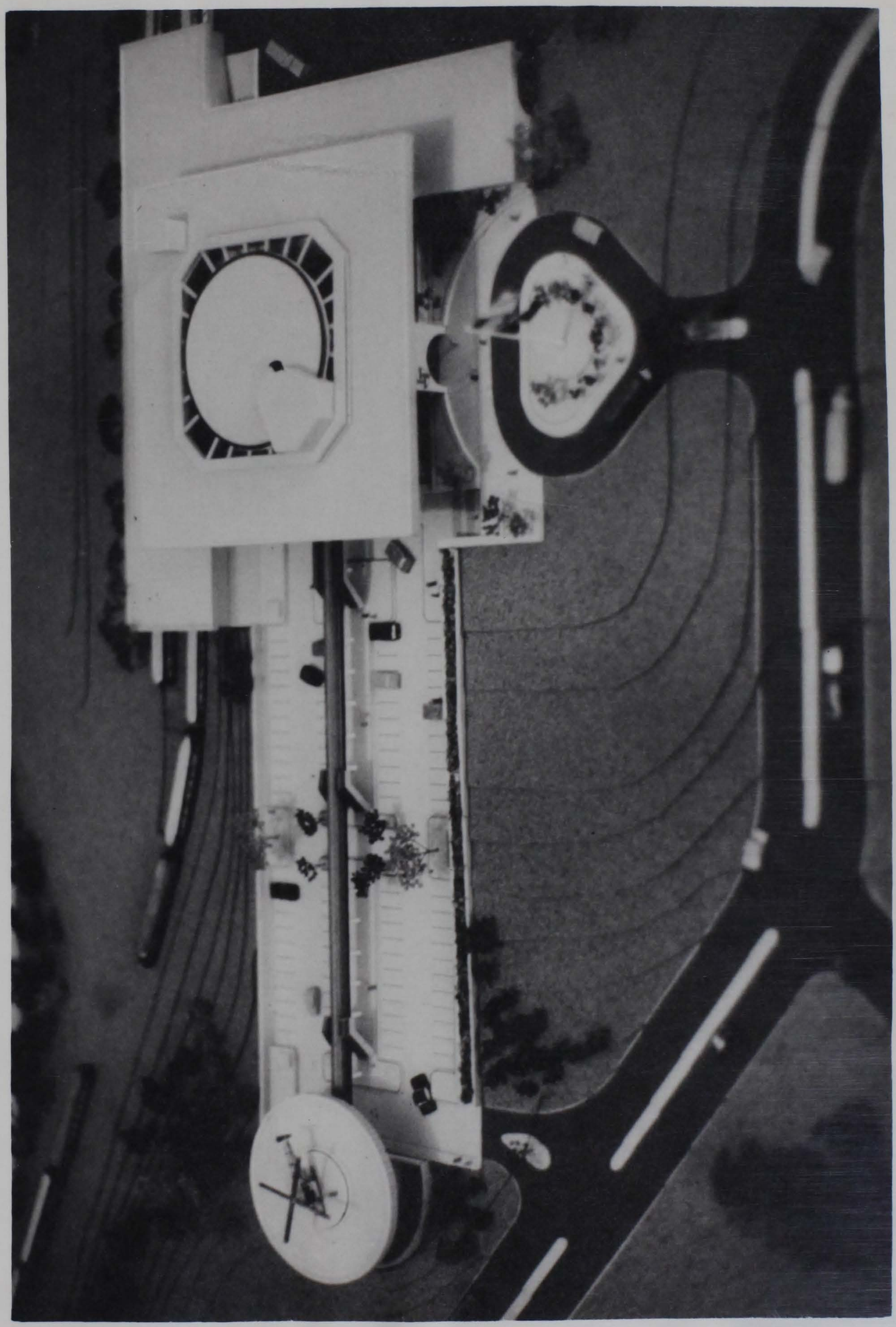


DETAILING STUDIES

A TERMINAL PROJECT
1970
DAVID HUDERT ROSS

6



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